

# **Services Producer Price Indices: Past, Present, and Future**

**Draft Paper**

May 26, 2006

## **Authors**

Roslyn Swick  
Deanna Bathgate  
Michael Horrigan

U.S. Bureau of Labor Statistics  
2 Massachusetts Avenue NE  
Washington DC 20212

This paper has been prepared for presentation to the Federal Economic Statistics Advisory Committee (FESAC) on June 9, 2006. It represents work in progress and does not represent any agency's final positions on issues addressed. The FESAC is a Federal Advisory Committee sponsored jointly by the Bureau of Labor Statistics of the U.S. Department of Labor and by the Bureau of Economic Analysis and the Bureau of the Census of the U.S. Department of Commerce.

## Table of Contents

---

|            |                                                                             |           |
|------------|-----------------------------------------------------------------------------|-----------|
| <b>1</b>   | <b>Introduction .....</b>                                                   | <b>1</b>  |
| 1.1        | Defining PPI Services .....                                                 | 1         |
| 1.2        | PPI Services Historical Perspective .....                                   | 1         |
| 1.3        | General PPI Principles and Guidelines for Services Expansion.....           | 3         |
| <b>2</b>   | <b>General Methodology for Developing New Service Industry Indices.....</b> | <b>4</b>  |
| 2.1        | Research Phase.....                                                         | 4         |
| 2.2        | Frame/Sample Research and Development.....                                  | 6         |
| 2.3        | Development of Collection Materials.....                                    | 7         |
| 2.4        | Review of Data/Publication.....                                             | 7         |
| 2.5        | Keeping the Service Indices Up to Date.....                                 | 8         |
| <b>3</b>   | <b>Industry/Sector Methodologies and Challenges.....</b>                    | <b>10</b> |
| <b>3.1</b> | <b>Finance and Insurance.....</b>                                           | <b>10</b> |
| 3.1.1      | Banking.....                                                                | 10        |
| 3.1.1.1    | Output Measurement.....                                                     | 10        |
| 3.1.1.2    | Service/Pricing Characteristics.....                                        | 12        |
| 3.1.1.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 12        |
| 3.1.2      | Insurance.....                                                              | 14        |
| 3.1.2.1    | Output Measurement.....                                                     | 14        |
| 3.1.2.2    | Service/Pricing Characteristics.....                                        | 17        |
| 3.1.2.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 20        |
| <b>3.2</b> | <b>Real Estate and Rental.....</b>                                          | <b>20</b> |
| 3.2.1      | Lessors of Nonresidential Buildings.....                                    | 20        |
| 3.2.1.1    | Output Measurement.....                                                     | 20        |
| 3.2.1.2    | Service/Pricing Characteristics.....                                        | 24        |
| 3.2.1.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 25        |
| 3.2.2      | Offices of Real Estate Agents and Brokers.....                              | 26        |
| 3.2.2.1    | Output Measurement.....                                                     | 26        |
| 3.2.2.2    | Service/Pricing Characteristics.....                                        | 26        |
| 3.2.2.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 27        |
| 3.2.3      | Passenger Car Rental.....                                                   | 28        |
| 3.2.3.1    | Output Measurement.....                                                     | 28        |
| 3.2.3.2    | Service/Pricing Characteristics.....                                        | 28        |
| 3.2.3.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 28        |
| <b>3.3</b> | <b>Health Services.....</b>                                                 | <b>29</b> |
| 3.3.1      | Hospitals.....                                                              | 29        |
| 3.3.1.1    | Output Measurement.....                                                     | 29        |
| 3.3.1.2    | Service/Pricing Characteristics.....                                        | 30        |
| 3.3.1.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 31        |
| 3.3.2      | Nursing Care Facilities.....                                                | 31        |
| 3.3.2.1    | Output Measurement.....                                                     | 31        |
| 3.3.2.2    | Service/Pricing Characteristics.....                                        | 32        |
| 3.3.2.3    | Sample Unit Identification and Frame and Sampling Issues.....               | 33        |

|            |                                                               |           |
|------------|---------------------------------------------------------------|-----------|
| 3.3.3      | Offices of Physicians.....                                    | 33        |
| 3.3.3.1    | Output Measurement.....                                       | 33        |
| 3.3.3.2    | Service/Pricing Characteristics.....                          | 35        |
| 3.3.3.3    | Sample Unit Identification and Frame and Sampling Issues..... | 36        |
| <b>3.4</b> | <b>Retail and Wholesale Trade.....</b>                        | <b>36</b> |
| 3.4.1      | Retail Trade.....                                             | 36        |
| 3.4.1.1    | Output Measurement.....                                       | 36        |
| 3.4.1.2    | Service/Pricing Characteristics.....                          | 38        |
| 3.4.1.3    | Sample Unit Identification and Frame and Sampling Issues..... | 39        |
| 3.4.2      | Wholesale Trade.....                                          | 39        |
| 3.4.2.1    | Output Measurement.....                                       | 39        |
| 3.4.2.2    | Service/Pricing Characteristics.....                          | 41        |
| 3.4.2.3    | Sample Unit Identification and Frame and Sampling Issues..... | 42        |
| <b>3.5</b> | <b>Information and Communication.....</b>                     | <b>42</b> |
| 3.5.1      | Newspaper and Periodical Publishing.....                      | 42        |
| 3.5.1.1    | Output Measurement.....                                       | 42        |
| 3.5.1.2    | Service/Pricing Characteristics.....                          | 43        |
| 3.5.1.3    | Sample Unit Identification and Frame and Sampling Issues..... | 44        |
| 3.5.2      | Software Publishing.....                                      | 45        |
| 3.5.2.1    | Output Measurement.....                                       | 45        |
| 3.5.2.2    | Service/Pricing Characteristics.....                          | 47        |
| 3.5.2.3    | Sample Unit Identification and Frame and Sampling Issues..... | 49        |
| 3.5.3      | Television Broadcasting.....                                  | 49        |
| 3.5.3.1    | Output Measurement.....                                       | 49        |
| 3.5.3.2    | Service/Pricing Characteristics.....                          | 50        |
| 3.5.3.3    | Sample Unit Identification and Frame and Sampling Issues..... | 51        |
| 3.5.4      | Cellular and Other Wireless Telecommunications.....           | 51        |
| 3.5.4.1    | Output Measurement.....                                       | 51        |
| 3.5.4.2    | Service/Pricing Characteristics.....                          | 52        |
| 3.5.4.3    | Sample Unit Identification and Frame and Sampling Issues..... | 53        |
| 3.5.5      | ISPs and Web Search Portals.....                              | 54        |
| 3.5.5.1    | Output Measurement.....                                       | 54        |
| 3.5.5.2    | Service/Pricing Characteristics.....                          | 55        |
| 3.5.5.3    | Sample Unit Identification and Frame and Sampling Issues..... | 56        |
| <b>3.6</b> | <b>Professional Services.....</b>                             | <b>57</b> |
| 3.6.1      | Output Measurement.....                                       | 57        |
| 3.6.2      | Service/Pricing Characteristics.....                          | 58        |
| 3.6.3      | Sample Unit Identification and Frame and Sampling Issues..... | 59        |
| <b>3.7</b> | <b>Administrative Services.....</b>                           | <b>59</b> |
| 3.7.1      | Temporary Help Services.....                                  | 59        |
| 3.7.1.1    | Output Measurement.....                                       | 59        |
| 3.7.1.2    | Service/Pricing Characteristics.....                          | 59        |
| 3.7.1.3    | Sample Unit Identification and Frame and Sampling Issues..... | 60        |
| 3.7.2      | Employment Agencies.....                                      | 60        |
| 3.7.2.1    | Output Measurement.....                                       | 60        |
| 3.7.2.2    | Service/Pricing Characteristics.....                          | 60        |
| 3.7.2.3    | Sample Unit Identification and Frame and Sampling Issues..... | 61        |
| 3.7.3      | Janitorial Services.....                                      | 61        |

|                                                            |                                                                                |            |
|------------------------------------------------------------|--------------------------------------------------------------------------------|------------|
| 3.7.3.1                                                    | Output Measurement.....                                                        | 61         |
| 3.7.3.2                                                    | Service/Pricing Characteristics.....                                           | 61         |
| 3.7.3.3                                                    | Sample Unit Identification and Frame and Sampling Issues.....                  | 62         |
| <b>3.8</b>                                                 | <b>Transportation.....</b>                                                     | <b>63</b>  |
| 3.8.1                                                      | Passenger Air Transportation.....                                              | 63         |
| 3.8.1.1                                                    | Output Measurement.....                                                        | 63         |
| 3.8.1.2                                                    | Service/Pricing Characteristics.....                                           | 63         |
| 3.8.1.3                                                    | Sample Unit Identification and Frame and Sampling Issues.....                  | 64         |
| <b>4</b>                                                   | <b>Where Does the PPI Go from Here?.....</b>                                   | <b>64</b>  |
| 4.1                                                        | What Aggregation Strategies Should Be Considered to Include Services?.....     | 64         |
| 4.1.1                                                      | Industry and Commodity Strategies.....                                         | 64         |
| 4.1.2                                                      | Special Aggregate Indices.....                                                 | 65         |
| 4.1.3                                                      | Future Developments.....                                                       | 66         |
| 4.2                                                        | What are the Gaps?.....                                                        | 66         |
| 4.3                                                        | What Principles Should Be Used to Determine where PPI Should Be Expanded?..... | 73         |
| 4.4                                                        | Concluding Remarks.....                                                        | 79         |
| <b>Addendum A - Data Analysis.....</b>                     |                                                                                | <b>80</b>  |
| <b>Addendum B - .SPPI Thesaurus.....</b>                   |                                                                                | <b>100</b> |
| <b>Addendum C - PPI Quality Assessment Procedures.....</b> |                                                                                | <b>108</b> |
| <b>References.....</b>                                     |                                                                                | <b>113</b> |

# **1 Introduction**

Since its publication of its first service sector industry in 1985, Railroad Line Haul Operations, the Producer Price Index (PPI) Program of the Bureau of Labor Statistics has introduced 135 service industry price indexes, with plans to introduce 6 more over the next two years. This ambitious and complex undertaking has helped close a significant gap in U.S. national statistics by publishing price indexes in industries that represent over 77 percent of in-scope service sector output. One principal purpose of this paper is to document the history of this important expansion. A second principal objective is to identify the gaps that remain both in service sector and overall industry coverage, and to suggest strategic approaches, both quantitative and qualitative, for prioritizing the closing of these gaps in the future.

There are four sections to this paper. In the first section, the general guidelines and principles for developing any price index, including service industry ones, are laid out along with a timeline of the significant publication and funding milestones reached in the expansion of service sector coverage in the PPI program. The second section of the paper provides a more detailed discussion of the steps that are taken by BLS to develop a price index for any service industry, from initial research on how to define output and the identification of price determining characteristics to sampling, data collection and on through to final publication. The third section of the paper discusses the methodological approaches and challenges to developing and maintaining high quality price indices for a select group of service providing industries. The industries selected provide a spectrum of the major pricing methodologies that were used in the overall service sector expansion. The fourth and final section of the paper explores future directions for the PPI Program. Two separate themes are explored. The first is to examine the potential that the service sector expansion has for creating new aggregation price indices that may include both the service providing and goods producing sectors. The second explores the remaining gaps in PPI coverage for the service-providing sectors and in the good-producing sectors. In particular, this section discusses and requests input on the criteria that are being developed to help determine the priorities in closing the gaps and where the emphasis should be for future PPI expansion efforts.

## **1.1 Defining PPI Services**

The mission of the Producer Price Index (PPI) program is to measure the average change in output prices received by domestic producers of goods and services. The PPI universe consists of the output from all industries that provide US domestic, marketed goods and services. Excluded from the PPI universe are output generating activities with no observable prices. In the services sectors, examples of such excluded service industries are Social Assistance and Funds and Trusts.

Although the PPI universe includes all marketed domestic services, some services subsectors have been excluded from the US PPI service sector development. These subsectors include, for example, Personal and Laundry Services and Food Services and Drinking Places, which are already included and more closely aligned with the measurement objectives of the Consumer Price Index Program.

## **1.2 PPI Services Historical Perspective**

Research into the development of the service sector PPI began in the mid 1980s, following the expansion of mining and manufacturing price indexes to include both industry and

commodity indices. As noted above, the first service sector industry index, Railroad, Line Haul Operations, was published in January 1985. In the late 1980s, several service industries in the transportation sector were developed and published. Although the publication of these industries represented a major developmental milestone in terms of publishing service industry PPIs, the pricing methodologies for these initial industries were very straightforward, with significant similarities to manufacturing sector industries.

While continuing to achieve success in the development and publication of the transportation sector industries into the early 1990s, the PPI program also undertook research on more complex service industries, such as hospitals, physicians, employment agencies, and telephone communication. This work was aided by the receipt of additional funding over 1990 to 1994 from the Initiative to Improve the Quality of Economic Statistics, or the so-called Boskin Initiative. These industries required development of new, revolutionary pricing concepts and methodologies. Success in these complex service industry developments was first achieved in January 1993 with the publication of the producer price indices for the three hospital industries, General Medical and Surgical Hospitals, Psychiatric and Substance Abuse Hospitals and Other Specialty Hospitals. The PPI service industry indices for Offices of Physicians and Employment Agencies followed with publication in 1994.

By the mid 1990s, PPI was regularly developing and publishing new indices for services industries. Some of the notable industries developed during this time include a variety of Professional services, such as Lawyers, Architects, and Accountants, Real Estate services, Prepackaged Software, and Property and Casualty and Life Insurance. In 2000, the PPI program achieved another significant milestone with the publication of the first Retail Trade industry indices, for Grocery Stores. Developing services price indices to measure the output for retail trade industries presented many new challenges. In 2001, after a long period of research and development, PPI service industry indices were published for Security Brokers and Dealers.

By 2001, the PPI program had introduced price indices for industries that represented 50% coverage of the in-scope services sectors as measured by 1992 GDP. In FY 2001, PPI received additional resources to continue the ongoing expansion of the PPI coverage of the services sectors.

Funding received in FY 2001 permitted continued expansion of service sector coverage and maintenance of indices already developed and in publication. In early 2000, in anticipation of the additional resources for services expansion in the PPI, research began on producing services price indices for the banking industries, the wholesale trade sector, and additional information technology industries. In 2005, another major milestone was achieved when industry indices for the banking industries and the wholesale trade sector were published. Also published in 2005 were indices for Internet Service Providers and Web Search Portals.

To date, the US PPI Program's publication of Service-Providing Producer Price Indices (SPPI) includes 100 service industry indices and 124 wholesale and retail trade indices within the Service-Providing Sector as defined by the 2002 North American Industrial Classification System (NAICS). Currently, the SPPI covers approximately 76% of in-scope service industries based on 1992 GDP.

### 1.3 General PPI Principles and Guidelines for Services Expansion

The U.S. PPI services expansion followed the same basic principles found in the mining and manufacturing PPIs. The same Laspeyres pricing formula was used with the same goal of monthly pricing for services. The same methods were used to collect the initial data and the continuous monthly data updates. Initial prices along with detailed price determining characteristics of sampled services are collected by field economists conducting in-person visits with the appropriate company officials. These in-person visits allow for detailed sampling methodologies to be employed to select the services to price over time. The selected services are repriced monthly by mail or fax.

As with traditional manufacturing PPI pricing, service PPIs measure the net return to the service establishment for providing a specified service to a specified buyer under specified transaction terms for a specified time.

The lessons learned from producing manufacturing PPIs provided substantial insight into the pricing of service industries. A complete service that can be priced over time has to be selected. A detailed description of the selected service is required in order to accurately price that service over time. The complete service should be priced at the time the service is provided and not when the service was contracted or ordered. "Future" prices are never included in the PPI. Lagged prices are also generally not acceptable in the PPI. If there are no transactions of the exact service provided during the pricing period and that service is still offered, then, as in manufacturing, the price for the service may be estimated based on current transactions for similar services. In order for the company respondent to provide an accurate estimate of the price, there will have to have been transactions that were similar enough to the selected service that the company respondent has sufficient information to calculate a current price. As in manufacturing PPIs, when the price for the service cannot be accurately measured by a single transaction price, average price or unit value prices are sometimes employed. The average prices are for a homogeneous group of service transactions for which the average price incorporates various competitive pricing and discounts and therefore, providing a more accurate price measure.

Also as in manufacturing PPIs, when a service item that is being priced is discontinued and a replacement service is selected, quality adjusting the difference between the two services is preferred, using the difference in provider or resource costs for the quality adjustment. There are some service industries where hedonic modeling regression may be used to determine the value of quality change between the services. This hedonic quality adjustment method is also used in several manufacturing PPIs such as computers and printers. However, in general, explicit quality adjustment has not been possible for most service industries and, as a consequence, the difference in price between a discontinued service and its replacement must be ignored in producing the index. The PPI program is continually researching to find alternative quality adjustment methods to use in service industries.

There are also some aspects to producing service PPIs that are completely different from manufacturing PPIs. In manufacturing, by following the same product over time constant quality is achieved. In some service industries, however, adjustments or updates have to be made to the service items over time in order to maintain the continuous pricing of the same constant quality of service. In some cases, the company respondents are able to update the service descriptions to keep the quality constant. In other cases, the data has to be adjusted using secondary sources in order to measure the same service over time.

An example of these adjustments can be found in the homeowners' property and casualty indices. An actual policy for a specific home and homeowner is selected to price over time. The level of risk in the policy is held constant by updating the value of the home being insured. The Marshall & Swift/Boeckh Building Cost Index is used to make adjustments for the value of the home. This index is used by the insurance companies and relates to the construction costs of homes. Additional specific examples of these adjustments or updates are found in Section 3. The adjustments or updates vary considerably by service industry.

Finally, the identification of the establishment or profit maximizing center (PMC) is sometimes much more difficult for service industries than manufacturing industries. The PMC is the unit of a company within which prices are formed, products are marketed, and records are kept. In some industries, the business models used by national service companies have made identification of the PMC very challenging. In other industries, the state regulations or other government regulatory agencies have dictated the corporate or business structure for the service companies.

## **2 General Methodology for Developing New Service Industry Indices**

Over the course of the past 20 years, a general methodology for researching and publishing new industry price indices, including those for service industries, has been developed. This model has been refined and updated over this time period. There are also some aspects of the development model or plan that are customized depending on the various characteristics of the industry, the current state of the economy, current level PPI resources, and a variety of other characteristics.

### **2.1 Research Phase**

The first phase in the development process for developing a new PPI is the research phase. The goals of the research phase are to identify and define the output of the industry, develop a pricing methodology that accurately measures that output, identify the various service characteristics (both price-determining and non-price-determining) of the output, and develop a methodology that allows the service industry index to maintain constant quality over time.

A certain amount of library or reference research is required initially to enable the researcher to become familiar with the industry. Once the researcher is familiar enough with the industry that issues and strategies can be outlined, contacts with trade associations and other industry representatives can be made. It is critically important to get input from industry members themselves. One of the reasons for contacting members of the industry is to see how they view themselves and their activities. An additional important reason for contacting industry members is to find out how the industry is structured, how record keeping is done in the industry, and how actual services are provided by that industry.

Depending on the results of the initial reference research, a plan is proposed for industry research that includes the contacts with industry members. For all interviews, a paper on goals and questions is developed and vetted internally, prior to the interviews. For very straightforward industries, one or two interviews may be sufficient. However, if the industry is very complex or has a large variety of different services, a larger number of interviews may be required. For complex industries, two or three initial interviews will be conducted and then the state of knowledge about the industry is evaluated, the goals and questions papers are revised

prior to conducting further interviews. A report is prepared after each interview, outlining what was learned and what issues still require further research or interviews. At the conclusion of the research phase, a methodology paper is prepared that summarizes the results from all of the research. This paper also addresses all the issues that arose during research and defines the industry output, specifies how to measure that output, defines the service characteristics, and provides insight into how to maintain a constant quality price index for this industry.

A comprehensive definition of the output of the industry must be developed. One of the best sources for the output definition is the System of National Accounts. In some cases, however, the definition in the SNA is not detailed enough for pricing an industry. Parameters that determine where the activity begins and ends are necessary to fully define the output of the service industry. In addition, the unit of measure corresponding to the defined output has to be identified.

Primary output is the ultimate service or product produced by an industry. With the exception of government operated or subsidized establishments, the output is generally the service or product that is traded on a market and has a price associated with it. For many industries, primary output is clear and easily defined. The trucking industries, for example, define their primary output as the transportation of goods from point A to point B. For the broadcasting industries, the output is not as clearly defined. Initially, it appears that stations produce a broadcast signal. However, this signal is delivered free of charge to the viewers and listeners, and therefore does not qualify as output according to PPI definition. What is bought and sold in these industries is access to an audience through the broadcast signal. This access is sold to advertisers through the sale of airtime. Retail trade and wholesale trade are sectors for which it is conceptually difficult to determine the primary output. After much research, PPI used the national accounts definition of trades. The output of the industries in these sectors is the provision of a marketing service, not the production of the good that is sold. The price of the good being sold is integral to the calculation of the price for the marketing service. However, since the service that is provided is marketing, the value of the good that is sold is not included in the net transaction price for this service. This is similar to the transportation industries where the value of the good being transported has a direct effect on the price charged for the transportation service but the value of the transported good is not included in the price of the transportation service.

A pricing methodology must be developed that accurately measures the price changes over time for the defined output. As seen in the example of broadcasting, developing a methodology for pricing the defined output is not always straightforward. But developing the methodology is an important step. If a methodology for pricing the defined output cannot be developed, then the current output definition is called into question. For some industries, multiple pricing methodologies need to be developed to measure output, owing to the diverse services within the output definition, each of which requires different pricing. For other industries, different companies may keep records or provide the service in very diverse manners. In these cases, multiple pricing methodologies may be used to measure the same output.

Identifying the service characteristics of the industry is another important step in the research process. The major components of the service customarily associated with the output need to be identified. These detailed service characteristics are used to ensure that the same service is priced over time. However, care must be taken to distinguish between characteristics that are price determining and cost factors that are not. The identification of the cost components of providing a service does not necessarily result in knowing the precise service or the final price of that service. For instance, while the cost of fuel is a major price determinant in the airline

industry, it is not a factor that uniquely identifies a particular service sold. For example, knowledge of the amount of fuel used does not result in knowing the price for a flight. In contrast, for the car rental industry, knowing how much fuel was purchased helps determine the fuel charge that is added to the base rate of the rental.

The final stage of the research phase is the analysis of the services provided by the industry to determine how to maintain a constant quality service over time. For the defined output of a service industry, a determination is made whether there is a need to use adjustments or updates to the services to maintain constant quality. If the services are variable over time, an appropriate quality adjustment methodology is explored.

Note that in some cases the price calculation methodology that was chosen may produce a constant quality price index without the need for an explicit quality adjustment strategy. Examples of these constant quality pricing methodologies in the past have included the use of unit value pricing or average pricing. In addition, for some industries, certain variables are held constant over time or a model pricing methodology is used that greatly reduces the need for quality adjustments. For some industries, additional variables are collected to allow for quality adjustment over time. Whenever possible, a quality adjustment or constant quality strategy is identified prior to collection of the data in order to be able to collect data that fits with the selected strategy.

## **2.2 Frame/Sample Research and Development**

Since revenue data are used as weights in the PPI, sampling by revenue is the ideal, implying that the ideal frame for sampling establishments would be Census Bureau's Business Register, which provides information on total revenues by establishment (also referred to as value of shipments or turnover). However, due to confidentiality limitations, the US Business Register is not available for use by the PPI program. The alternative frame most generally used for sampling, especially for Mining and Manufacturing industries, is the BLS Quarterly Census of Establishments and Workers (QCEW), which provides a count of employees by establishments. This database is compiled from the unemployment insurance data that are filed in each state for establishments that have employees. For mining and manufacturing industries, there is generally a strong positive correlation between the number of employees and revenue data. However, for most service industries, there is very little correlation between the number of employees and revenue data. Due to the lack of access to the Census US Business Register, the PPI program is faced with a continual challenge of finding alternative sources of frame data for sampling of service industries and uses the BLS QCEW only as a fallback. Trade associations and government agencies are sometimes the best sources for the most appropriate frames for some of the service industries. However, in a few industries, stratification and weighting of the establishments have had to occur after data collection because there was insufficient data to sample appropriately. Some alternative frames that are used do not have revenue data as a basis for sampling. In these industries, an alternative size measure data in the frame is selected that closely relates to the output of the industry. For example, in cable TV, the lack of revenue data resulted in the use of the number of subscribers as the relevant size measure.

Once the appropriate frame source has been selected for a service industry, frame refinement is conducted to locate and verify the establishment's location and industry classification. For each industry, the general location for collecting the data for the PMC is determined. This location may be a national headquarters, the local units or somewhere between these two.

However, for many industries, frame refinement can only be done for the largest establishments in the industry since the frame contains so many establishments.

During the collection visit, sampling is done on the establishment revenue data in order to select representative services to price over time. The same probability-proportionate-to-size (PPS) sampling that is used in manufacturing industries is used in service industries. In a few industries, the items to be priced are selected from a national sample of services prior to the data collection visit. Item sampling prior to data collection is generally used when an industry has a large and diverse number of services and the PPS sampling would be very difficult to complete with company data at the data collection interview. An example of an industry where items were selected prior to data collection is hospitals.

## **2.3 Development of Collection Materials**

From the research that was done in the first phase of the development of the service industry, procedures for the collection of the service data are developed. These procedures detail how the prices are calculated for the various services provided by the industry and what data are required to perform the price calculation. These procedures may also include locating the appropriate establishment, identifying the most likely respondent in an establishment, assembling information on discounting or price variations and how to apply them, and developing information on the monthly pricing instructions to provide to the respondent.

Also developed from the research that was done in the first phase of the development of the service industry are data collection materials. These materials include a detailed paper that describes all the characteristics of the industry, the frame and sampling sources, and procedures and any other additional information about the service industry. A list of all price determining characteristics that were defined in the research phase is used for developing a checklist that describes the exact services selected. These checklists include all possible characteristics (including non-price determining) that a service may have and some 'all other' lines for recording more detailed descriptions.

After the collection procedures and materials for data collection have been developed, the final phase of the development process of the collection materials is the preparation of the training. This training is done in a variety of formats – in person, video, conference call or computer-based training. This training is given to all of the staff (field economists) that will be collecting data for a particular service industry and their supervisors. The development of the training materials also serves as an additional review of the procedures and materials. For many service industries, prior to the development of the training, selected field economists who will be collecting the data are asked to pretest the procedures and materials in order to determine if they meet the needs of the field economists, have covered all the procedures, and have properly defined all of the services and their characteristics.

## **2.4 Review of Data/Publication**

After the data has been collected from the establishment by the field economists, they are reviewed and monthly repricing begins. In a few industries repricing is conducted less frequently than monthly, consistent with observed market pricing mechanisms. For example, portfolio managers are only paid on a quarterly basis. Automobile insurance is a highly regulated industry and premiums for each automobile insurance policy is fixed for at least six months and so the policies are repriced when the premium is updated.

Calculation of test indices usually begins within 6 months after the start of repricing. Review of test indices and their underlying micro data help to identify outliers and any specific, and in some cases, systemic problems with the pricing of certain services. Communication with respondents is critical during this phase to resolve specific measurement and interpretation issues, educate them on reporting requirements and, as appropriate, the need for additional information in order to ensure that the same constant quality service is priced over time. The data in the test indices are also analyzed to determine if the correct price movement over time is being shown in the indices. If the correct output definition was used with the correct pricing methodology, then the index data should show a predictable price movement over time. Analysis of the time series data is used to validate the output definition and pricing methodology. In determining whether or not the output definition, pricing methodology, and quality adjustment strategy are appropriate for an industry, the national income accounts are also utilized to examine the performance of the test index as a deflator.

After the test indices are reviewed and determined to be of sufficient quality, publication of the data is planned. If there were changes made to the pricing methodology during the test index phase, then the data series has to be rebased or started over and test data are not published. If the test index data did not require any changes to the pricing methodology and there was sufficient coverage for the entire test period, then the test index data can be published when the service industry indices are published. Also during the preparation for publication phase, a short article describing the pricing methodology and announcing the publication of a new service industry is prepared. This short article will appear in the PPI Detailed Report and on the PPI website.

## **2.5 Keeping the Service Indices Up to Date**

A constant challenge for the PPI program that occurs in both services and manufacturing PPI is keeping the services price indices up to date. The PPI is a modified Laspeyres index based on the fixed input output price index concept, or FIOPI (see Robert B. Archibald, "On the Theory of Industrial Price Measurement: Output Price Indexes," *Annals of Economic and Social Measurement*, winter 1977). While adhering to the FIOPI model is conceptually correct for the PPI, there is a danger that the services being priced will no longer represent current market conditions. In order to ensure that the indices are representative, several strategies have been developed to reduce or eliminate new item bias. New item bias could occur in industries where there is rapid service or product development that cannot be captured by the usual resampling process. In the US PPI, resampling occurs roughly every seven years. When a new sample replaces the old sample, it is important that comparable items are priced in both samples lest the new item bias be created.

One of the methods used to ensure that there is no new item bias in the PPI is referred to as directed substitution. New item bias would occur if the service or items being priced in the index were no longer reflective of the current mix of services or items in the market place. A procedure is used to verify that there is no new item bias or to direct the researcher to substitute to items to ensure that there is no new item basis for the industry. The researcher contacts the current respondents in the PPI sample for an industry and obtains data about the distribution of their items by revenue. If the new distribution of revenue for items deviates significantly from the items currently being priced, a sampling technique is used to select new items to price. If the new distribution of revenue for items does not deviate from the distribution of the current items being priced, then no substitution is necessary. Therefore, the procedures used during the review of monthly price data have kept the items being priced current and no new item bias exists. This procedure was used every year in the late 1990s and every other year since then

for the PPI Software Publishing industry. This procedure ensured that the software priced in the PPI is representative of the market for software. This directed substitution is used when the new items or new services are provided or produced by currently sampled establishments. Directed substitution is performed as needed for all industries, including services, in the PPI sample. This procedure does not materially increase the reporting burden for the establishments that are currently reporting data to the PPI.

Another procedure that is used to keep the PPI service indices up to date is sample augmentation. Sample augmentation is used when there are industries with rapid changes in services being provided. Sample augmentation may be performed to add additional items to current establishments. In order to incorporate the newest services, additional service items are requested from establishments that are currently providing data for that industry. This method is used selectively due to the increase in establishment burden. Sample augmentation is also used to add additional establishments to an industry. Many times the newest services are being provided by new entrants into the industry. New establishments are selected and new services from those establishments are added to the current PPI index, thereby, ensuring the index is up to date.

Another method for keeping the index up to date is the use of quality adjustment. Quality adjustments are used to maintain constant quality price indices where the services provided have changed. When price-determining characteristics change (change in output), the FIOPI concept is violated. The corresponding input changes are utilized to disentangle price changes from changes in the production function. The preferred quality adjustment method for PPI is to use the production or provider cost difference between the old items and the new items. The production or provider cost differences are used to net out the price differences between the items and have the index reflected only pure price change. For example, in the cable TV industry, provider cost is usually available to quality adjust for changes in the channels provided to customers. In some service industries, there is limited information on providers' costs to use for quality adjustment.

In some industries, the pricing method selected removes the need for quality adjustments. For example, in the cellular telephone industry, unit value pricing methods are used to collect monthly price data. Using this method all plans are included in the pricing so that when plans change there is no need to quality adjust. One of the reasons that this pricing method was selected was that establishments in the cellular telephone industry tend to change plans frequently.

Hedonic models have been used to determine a value of quality adjustment if there are sufficient item data available. For retail trade industries, hedonic models have been attempted for several industries. Retail trade was selected to try hedonic modeling for quality adjustment because of the unique characteristics of the industry. The output of the industry is marketing and is measured by margins. Products are selected to determine the margin, but quality adjustment would not be based on the products themselves. Quality adjustment would be required for retail trade establishments when the service characteristics performed by the establishment change. Therefore, hedonics can be used to quantify the changes in the characteristics such as hours of operation, number of checkouts and other similar features. A hedonic model for quality adjustment was unsuccessfully attempted for grocery stores. The model was not successful because the dispersion of the margins on the different products was too diverse. A successful hedonic model for quality adjustment has been developed and is currently in use for liquor stores. The hedonic model for liquor stores was successful because the margins and products were very homogenous.

Additional alternative quality adjustment methods have been implemented for several service industries. An example of alternative quality adjustment is nursing care facilities. A methodology for quality adjusting nursing care facilities was instituted utilizing government inspection data on staff hours in conjunction with wage data on health care jobs.

### **3 Industry/Sector Methodologies and Challenges**

This section highlights the methodologies implemented for a selection of service industries and sectors. Specifically included are discussions of output measurement, pricing characteristics, sample unit identification, and frame and sampling issues. The industries and sectors selected best illustrate the challenges faced in developing pricing methodologies for service industries.

#### **3.1 Finance and Insurance**

##### **3.1.1 Banking**

###### **3.1.1.1 Output Measurement**

###### **Output definition**

The primary output of the banking industry is the provision of financial services including financial intermediation. For this industry, financial intermediation can be defined as the assumption of risk that arises from taking money from depositors and lending it to borrowers.

The output can be further defined by the specific types of services provided by banks. The major service lines follow:

- *Loans* – Loans are assets of a bank defined as funds advanced to a borrower to be repaid at a later date, usually with interest. Included in the loan category are residential real estate, nonresidential real estate, home equity, commercial and industrial, agricultural, new and used auto, and credit card loans.
- *Deposits* - liabilities of a bank defined as funds placed with a bank in an account subject to withdrawal. Included in the deposit category are demand, time, and savings accounts.
- *Trust services* - Trust activities involve the bank's acting in a fiduciary capacity for an individual or a legal entity, such as a corporation or an individual's estate. This typically involves holding and managing trust assets for the benefit of a third party.
- *Other banking services* – These services include standby letters of credit, correspondent banking, sale of securities, cash management and other miscellaneous services.

###### **Pricing methodologies**

One of the primary challenges in this industry is to measure financial intermediation services indirectly measured or *FISIM*. Banks often provide services for which they do not explicitly charge by paying or charging different rates of interest to lenders and borrowers. They pay lower rates of interest than would otherwise be the case to those who lend them money and charge higher rates of interest to those who borrow from them. The resulting net revenues of

interest are used to defray their expenses and provide an operating surplus. This scheme of interest rates avoids the need to charge customers individually for services provided and leads to the pattern of interest rates observed in practice<sup>1</sup>.

Thus, it is necessary to develop a methodology that not only captures directly priced services but also reflects services priced indirectly. This methodology must allow interest to be allocated between loans and deposits.

The user cost methodology is implemented in the PPI. The user cost for a financial service is the difference between its revenue and the sum of its implicit and explicit costs. To measure these implicit costs, interest is allocated between loans and deposits by means of a "reference rate." The reference rate is the opportunity cost rate of money from which the risk premium is eliminated to the greatest extent possible and which does not include any intermediation services<sup>2</sup>. In theory, the price of a loan is equal to the asset holding rate less a reference rate. The asset holding rate is the interest received plus service charges. For deposits, the price is equal to a reference rate less the liability holding cost rate. The liability holding cost rate is the interest paid to depositors less service charges.

In measuring the prices for both loans and deposits, the same reference rate is used. Using two different rates could result in double counting, which would overstate price movement, or part of the output price could be missed, which would understate price movement. Currently, the reference rate is the weighted average of all banks' holdings of U.S. Treasury securities.

In practice, the price of these services can be expressed as shown below. Again, both services are priced at the portfolio level.

$$\text{Loan Price} = \left[ \left( \frac{\text{Earned interest income} + \text{Fees}}{\text{Average loan balance}} \right) - \text{Reference rate} \right] * \$1000$$

Earned interest income includes all interest actually received in a given month for the portfolio of loans being priced. This includes interest earned on both old and new loans. The average loan balance is calculated by averaging the ending daily balances of the loans in the portfolio over the month.

$$\text{Deposit Price} = \left[ \text{Reference rate} - \left( \frac{\text{Interest payments} - \text{Earned fees}}{\text{Average deposit balance}} \right) \right] * \$1000$$

Interest payments include all interest actually paid to depositors on the funds held in the portfolio in a given month. Earned fees should include all fees, such as those for ATM withdrawals or insufficient funds, that are actually collected by the bank. Again, the deposit balance is calculated by taking the average of the ending daily balances of the portfolio.

For both equations, the calculation within the outer brackets results in a rate. This rate is multiplied by \$1000 to convert the rate to the dollar value used in index calculation. When the

---

<sup>1</sup> 1993 System of National Accounts

<sup>2</sup> Ibid.

price is positive, the service will be considered on output. However, whenever the price is negative, the service will be considered an input and the price will be excluded from index calculation until it becomes positive.

For trust and all other banking services, the price is equal to the actual fee charged for performing the service. These fees can be a percentage of assets or a flat fee.

### **3.1.1.2 Service/Pricing Characteristics**

For loans and deposits, the unique item to be priced is represented by a homogeneous portfolio of accounts (e.g. all 15-year fixed rate residential mortgages or all 1-year certificates of deposit). Trusts and other banking services are priced by selecting an individual transaction.

Once the actual service is selected, its price determining characteristics are identified to permit monthly repricing of the same unique item. The following characteristics are common for most services:

- Type of service (e.g. mortgage loans, money market savings account, trust)
- Term of service (e.g. 15-year loan, 5-year certificate of deposit)
- Type of fees (e.g. late payment, automatic teller machine, early withdrawal penalty)

### **Constant quality measurement issues**

A fundamental issue in pricing banking services is the ability to maintain constant quality. Particular to these services is the need to keep monetary values stated in terms of constant dollars. Periodically, certain values included in the price calculations are to be adjusted by the GDP chain-type price index to account for the time value of money. It is the \$1000 conversion factor that is to be adjusted for loans and deposits. For other services for which the price is based on the value of assets, such as trust services, the assets will be adjusted.

### **3.1.1.3 Sample Unit Identification and Frame and Sampling Issues**

The sample was divided into two tiers: small banks and large banks.

#### ***Small Banks***

The sample unit is the bank's headquarters. It may be the case that a sample unit operates both as the bank's headquarters as well as the bank's branch. This may be the case for small rural banks. There will also be instances where the bank's holding company may be located in the same building as the bank's headquarters

The "small" banks were sampled as the "whole" bank. That is, all output of the banks was given a chance of selection

#### ***Large Banks***

The "large" banks were sampled by department. Keep in mind that these are BLS-created departments. That is, they may not match the actual department structure of the sample unit. There are seven department designations:

- Mortgage Loans
- Agricultural Loans
- Commercial Loans
- Consumer and Other Loan Services
- Retail
- Trust services
- Other banking services

The retail department refers to “deposits.” Only the output of the sampled department is eligible for selection

The frame used for the banking industries was a file provided by the Federal Deposit Insurance Corporation. This file provided a comprehensive list of commercial banks and savings institutions and revenue for each entity. However, the file did not provide departmental data necessary for sampling the larger banks. Therefore, departments were created and given an equal chance of selection within each of these banks.

The sample for this industry was drawn in two stages. For the first stage sample, banks were chosen by probability proportionate-to-size sampling based on revenue. For the second stage sample, selections were made from the set of BLS defined departments for each bank in the top half of the sample. This created multiple sample units for a single bank in most cases.

The services to be priced were pre-selected. For loans and deposits, the unique item to be priced is represented by a homogeneous group of accounts (e.g. all 15-year fixed rate residential mortgages or all 1-year certificates of deposit). Trusts and other banking services are priced by selecting an individual transaction.

## **Government Regulations**

Because of its close association to the economic stability of the U.S., the banking industry will always be under close watch by regulators. The operation of the banking system is essential to the economic well being of a nation. Therefore, the banking system cannot be subjected to fail. Before failure is eminent, banks try to control expenses by mergers and consolidations.

Much of this profuse regulation stemmed from the 1929 depression when the banking industry collapsed. The first of many regulations that followed is the Glass-Steagall Act of 1933, which prohibits payments of interest on demand deposits, establishes the FDIC, establishes interest rate ceilings on savings and time deposits, and most importantly separates banking from investment banking.

This separation of banking activities from other financial services allows the PPI to accurately define the profit maximizing center for all units in the sample frame.

### **3.1.2 Insurance**

#### **3.1.2.1 Output Measurement**

##### **Output definition**

The primary output of the insurance sector is the assumption of risk (transfer of risk from the policyholder) and financial intermediation. In these industries, financial intermediation is the investing of someone else's money with the goal of partially offsetting the size of the premium payment.

The policy underwritten by the insurer represents the unique output. The policy lists the coverages for which restitution would be made to the policyholder to cover claims. The amount of risk being transferred to the insurer is clearly stated in terms of covered benefits (and benefits not covered) and it obligates the insurer to pay claims for all such occurrences. So, the output is the transfer of the risk of financial loss from the policyholder to the insurance company.

##### **Pricing methodologies**

###### ***General methodology***

The operational definition of assumption of risk plus financial intermediation is premium plus rate of return on investment. Investment income is crucially important to the industry and greatly affects their pricing decisions and its inclusion should yield a smoother statistic that would facilitate the regulatory decision-making process. Companies may well reduce premiums when the rate of return increased in response to competitive pressures, as well as raise premiums when the rate of return is lower.

Thus, the price can be expressed as

$$\text{Price} = \text{Premium} (1 + r)$$

where  $r$  is the annual return on the invested portion of the premium for the particular type of insurance that is being priced. This rate is stated as a percentage of all premiums paid.

There are mutual companies whose policyholders are also the stockholders of the company. These companies typically pay out a dividend rebate to the policyholders on an annual basis. In such cases, the dividend would be subtracted from the premium to obtain a net transaction price. This price can be expressed as

$$\text{Price} = \text{Premium} (1 + r) - \text{Dividend}$$

To track premium movement in the property and casualty industry, companies provide estimated premiums for model policies. This is an actual policy selected by probability where the premium determining characteristics are held constant while the policy is repriced on a monthly basis. The insurance company estimates the current premium for this model policy by using current charges applied to the policy characteristics of the actual policy. This premium remains unchanged until the policy is priced again the following year.

The major difference in repricing a model policy versus repricing an actual policy is that the insured may modify the policy over time. For example, an auto policyholder could add a teenage driver in year two of the policy, increase the liability, or reduce the deductible. Such a change in the repriced item violates the Laspeyres assumption of fixed quality. By holding the policy characteristics constant, the fixed quality assumption is realized.

In order to hold inflation-sensitive characteristics constant, periodic adjustments are made to account for inflation. For homeowners insurance, the dollar limit of coverage is adjusted annually to account for construction price inflation. The assumption is that the policyholder is insuring to secure a constant flow of services from the insured property. If there is price inflation affecting the cost of repair or replacement of the damaged property, the coverage limit should be escalated to reflect this increase. This adjustment is made annually on the anniversary date of the policy. This reflects what actually occurs – where the company makes these coverage adjustments at the time of policy renewal. As the index is tracking several thousand policies selected on a probability basis, there is a spread of policy anniversary dates throughout the year. This yields a smoother behaving index than making this adjustment for all repriced items at one time.

The source to be used for the escalation is dependent upon the insurance company. If the company cannot make a recommendation as to how the inflation-sensitive policy characteristics should be adjusted, PPI decides the appropriate index to use. For example, the E. H. Boeckh Building Cost Index is used to escalate the coverage limit for homeowners insurance. A different procedure will be used for Workers Compensation Insurance. The workforce in the group is held constant (same number of people in the same jobs), but the wage rates are adjusted to account for general wage inflation. In this case, the Bureau of Labor Statistics' Employment Cost Index is used.

The investment rate of return is calculated by all insurance companies as a percentage of the premium. An annual report is prepared by all companies which includes this calculation. The report provides the investment rate of return by insurance line calculated as a percent of premium. As with the inflation-sensitive policy characteristics, the rate of return is updated annually for each priced item on the policy anniversary date.

### ***Life insurance***

In general, the premiums for life insurance policies are level and correspond to the age and sex of the policyholder as well as the duration of the policy. For whole life, the premium is one that allows the policy to endow at the age of 95 or 100. That is, we obtain the premium that allows the cash value to equal the death benefit when the insured reaches 95 or 100 years of age.

However, for universal and variable products, premiums are not level as they are for term and whole life. These premiums vary at the discretion of the policyholder making them an inaccurate measure of output. For these particular products, policyholders may pay whatever premium they wish as long as they pay the minimum required to keep the policy in force. The policyholder bears some of the risk and, in return, the policyholder gets to capitalize on the potential for increased saving or increased death benefits using the policy as an investment vehicle. Since the death benefit is held constant, the premium varies when the policyholder adjusts the amount of money they are saving or investing. These additional or increased premiums, which increase the savings, should not be reflected in the index as price increases. Therefore, pricing of premiums for universal, variable, and variable universal life insurance would be a meaningless way to measure price change.

Instead of measuring premiums, extracting the various fees charged to administer the policy measures the output of these policies, taking the total fees as the price. While this seems to be the ideal way to measure the price, much as the formula suggests, this can only be done for the variable and universal products. Therefore, type of price for these policies is a combination of the various fees assessed for the provision of the policy. These total fees represent the expenses or costs listed on the right side of this equation:

$$\text{Premium} (1 + r) = \text{MC} + \text{EXP} + \text{P} + \text{C}$$

where  $r$  = earned rate on investments, MC = mortality costs, EXP = expenses, P = profits, and C = contingency allowances.

### **Annuities**

Although companies receive a consideration, or premium, for provision of an annuity, they only retain a portion of it. The other portion is invested on behalf of the annuitant. The price to be collected is the same for both individual and group annuities. All money invested, net of any fees and/or interest retained by the insurance company, is intended to be returned to the annuitant. The outputs from annuities are measured by fees and/or interest.

For variable deferred annuities, the fee methodology used for universal and variable insurance was adapted to measure the output of these annuities. Fees charged for provision of these annuities are generally some percentage of the account value. These fees cover expenses, mortality risks, and investment management.

- *Mortality and expense risk charge* - charge for mortality and expense risks. It is typically a percentage of the account value and can be expressed in terms of an annual percentage.
- *Administrative charge* - annual fee is deducted from the annuity account value for the costs of administering the annuity.
- *Investment advisory fee* - fee assessed for advisory services provided in association with the annuity portfolio.

Therefore, the total fees are the PPI "price". The earned rate on investments will be used to adjust the account values for repricing purposes. This rate will not be added to the 'price'.

For fixed-rate annuities, companies only earn revenue from the difference in the interest that they earn and interest that they credit to the annuitant. The difference is applied to the account value. In addition to this interest spread, companies may charge a flat administrative fee.

Immediate annuities seemed more difficult to price due to concerns with mortality costs. Companies say that the best measure for price change is their actuarial rate. This is the rate at which they derive the premium or consideration. It is calculated as the present value of the payment of one dollar every month for the expected duration of the annuity. It can be obtained by dividing the premium paid by the monthly payout or by taking the reciprocal of the payout rate per \$1000. Companies say that this rate is loaded with expected expenses, profits, and mortality costs. An example is the sale of an annuity with a payout to the annuitant of \$12 per \$1000 of premium. The "price" paid by the annuitant to purchase the annuity is \$83.33 per \$1 of benefit ( $=\$1000/\$12$ ).

Companies can also earn an interest spread as they do for fixed-rate annuities. Another option is to price the front-end load earned on the premium. This is typically a small percentage of the total premium.

### **3.1.2.2 Service/Pricing Characteristics**

Actual policies were chosen by probability proportionate-to-size sampling based on certain price determining characteristics of the policies. Once an actual policy is selected, its price determining characteristics are identified to permit repricing of the same unique item. The following policy characteristics are common:

#### ***Property and casualty insurance***

- *Type of property or risk* - provides the characteristics of the insured property.
- *Type of coverage* - includes physical damage coverage and liability coverage.
- *Dollar limit of coverage* - maximum amount of money the insurer is legally obligated to pay in the event of a claim.
- *Coinsurance clause* - percent of the value of the property to be reimbursed by the insurer.
- *Deductible* - insured bears the first part of any loss covered by the policy up to a specified amount.
- *Length of policy period* - time frame for which the policy is in effect.
- *Perils covered* - specific risks that the insurer assumes.
- *Location of the insured property* - risks vary by geographic location.
- *Past loss experience* - premiums generally are lower if the insured has a past record of making fewer claims.
- *Valuation of insured property* - either the actual cash value of the property, which adjusts for depreciation, or the replacement cost.
- *Valuation of risk exposure* - valuation for liability coverage.

#### ***Life insurance***

- *Type of policy* - whether the policy is term, whole life, universal, etc. will have an effect on the premium amount. Premiums for term tend to be lower.
- *Age of insured* - the older the insured, the higher premiums will be due to increasing.
- *Sex of insured* - premiums tend to be higher for males than for females since males.
- *Face amount of policy* - premiums will increase as the amount of coverage increases in order to cover potential claims.

- *Smoker/non-smoker* - premiums tend to be higher for people who smoke due to health risks which increase mortality.
- *Health of insured* - the healthier the insured, the lower the premiums will be since chance of premature death is expected to be lower.
- *Duration of the policy* - the n<sup>th</sup> year of the policy (i.e. 1<sup>st</sup> year, 5<sup>th</sup> year, etc.). Premiums or fees may change depending on how long the policy has been in force.
- *Riders* - policy may have a provision for additional coverage called a rider. These riders may provide additional coverage for spouse or children of the insured. Riders will increase the premium otherwise payable.

### **Health insurance**

- *Type of coverage* - underwriters will require different information in order to provide prices for medical service plans, long-term care, and other services.
- *Amount of coverage (richness of benefits)* – includes the number of covered services, the dollar amount of coverage for each service, and the maximum dollar amount of coverage.
- *Census class* - prices for the same service within the same group will differ according to the rate or census class. Generally, families will pay a higher premium than an individual within the same group plan.
- *Voluntary vs. non-voluntary (contributory vs. non-contributory)* - voluntary (contributory) group policies will be defined as policies for which the employee pays 100% of the premium. Non-voluntary (non-contributory) group policies will be defined as policies whereby the employer pays 100% of the premium. The percentage contribution of the employer or the employee can vary anywhere between 0.0 and 100.0%.
- *Group composition* - the combination of gender and age ranges is an important factor in determining the premium. Therefore, companies require the age and gender of each person covered by the policy, including spouses and children.
- *Medical history* - previously healthy people will generally pay lower premiums than those who have a record of health care utilization.
- *Occupation* - people employed in dangerous occupations will generally pay more than those in sedentary, low risk occupations. The classification code (NAICS or SIC) of the industry is usually used for underwriting purposes.
- *Geographic location* - people who live in areas in which natural disasters often occur and/or pollution is a problem will generally pay higher premiums than those who do not. The zip code (usually the first three digits) is used for underwriting purposes. For large groups, or small groups which are geographically dispersed, several zip codes/geographic regions may apply. However, a national rate may be used if a group is very well dispersed throughout the nation.

- *Earnings* - As incomes rise, utilization rates tend to increase. Thus, premiums tend to increase as income increases as well. Earnings will be most important in determining a price for accident insurance. Maximum benefits paid are usually based on income.
- *Smoking Status* - Smokers generally pay higher premiums than non-smokers.

## **Constant quality measurement issues**

The fundamental issue in pricing insurance services over time is the ability to identify and adjust for changes in risk. For changes in explicitly endogenous risk factors such as changes in coverage or deductibles, companies have suitable cost data to allow for meaningful cost based quality adjustment. However, for changes in exogenous risk factors that go beyond the scope of policy negotiations, such as an increased incidence of theft or a severe hurricane season, company specific data would not be sufficient to definitively quantify risk. Only outside data sources will be able to identify short-term vs. long-term changes in risk.

Such an outside data source is used in the quality adjustment of private passenger auto insurance where risk changes occur even though the age of the insured auto remains the same. To keep the age constant, the model year of the auto is updated once a year to the next model year. For example, a 1996 Honda Accord is changed to a 1997 model. However, changing the model year can also move the auto into a different risk category known as a symbol group. Insurance companies are unable to assess this risk change on their own, but a valuation can be obtained from Insurance Services Office (ISO). This organization pools risk information industry-wide, producing data which is broader in scope than any that one company could gather on its own. The ISO assigns autos to symbol groups based on their risk characteristics. For PPI purposes, the ISO provides the value of risk change for every auto included in the index. The ISO monitors the symbol group that is assigned to an auto and the particular risk associated with that symbol group. When an auto moves into a different symbol group, ISO assigns a value to the risk change that occurs. This value is then used to explicitly quality adjust the premium used in the PPI. Therefore, the risk changes are not reflected in the index as price changes.

However, it is not always clear that we would know when a shift in underlying risk truly occurred. Over the past few years, claims for mold damage have increased significantly. Has the climate changed such that there is increased risk of mold? Are policyholders just making more claims against their homeowner's policy? Decisions must be made in real time, and sufficient data simply may not be available in the current month to identify and quantify the effect of these changes. Mold has always existed, but until 2001, mold was not a factor in the homeowner's insurance market. However, public anxiety over major lawsuits in Texas and California have led to an increase in claims due to water damage (mold was only covered by policies if it was related to a covered peril such as a burst pipe). As a result, the increase in costs has driven premiums upward. Do we quality adjust these premium increases that occurred to help cover the higher claims since 2001? In the PPI, it has been treated as an increase in utilization as there has been no observable shift in weather patterns to indicate a change in risk.

Another issue is the new item bias that can be present in both repricing methodologies. However, this bias may be especially problematic when pricing a frozen policy. Over time, this policy may no longer be representative. Mandated coverages may change or new insurance products may be introduced. Although bias may not be as prevalent when following an actual policy, it can occur if the general population has changed their preferences for the type of

insurance product that they purchase or if the policy represents a smaller portion of the company's business.

The PPI program has developed a "directed substitution" procedure to reduce new item bias. This procedure captures evolutionary changes to a current product or service that did not exist when the sample was selected. Periodically, each company will be contacted in order to review the insurance products included in the sample. The existence of these evolutionary changes in the industry will be identified and disaggregation will be performed to determine if a substitution should be made from the current product to an evolutionary product or to add the new feature to the description of the current product. Producer cost based quality adjustment will then be attempted to adjust for these changes.

### **3.1.2.3 Sample Unit Identification and Frame and Sampling Issues**

Most insurance companies are affiliated with an insurance group. The sample unit location for these companies is the group headquarters. For single establishments with no group affiliation, the sample unit is the company headquarters.

Many companies may operate in more than one insurance industry. Therefore, it was necessary to create separate profit maximizing centers (PMC) for each type of insurance within each company. For property and casualty insurance, the PMC was further broken down by line of insurance.

The A.M. Best Company's Key Rating Guide was the frame source for all insurance industries. This frame provided the necessary information to create the appropriate PMCs for each industry. In addition, premium revenue was provided as a measure of size.

## **Government Regulations**

Each state regulates the insurance companies operating within its boundaries. All companies are required to file an annual statement with the state insurance commission. In addition there are three separate filings for property and casualty, life, and health insurance business activities. Thus, PPI can divide the frame units into the appropriate PMCs for each insurance industry.

## **3.2 Real Estate and Rental**

### **3.2.1 Lessors of Nonresidential Buildings**

#### **3.2.1.1 Output Measurement**

##### **Output definition**

Two primary outputs can be measured for this industry. The first is providing the physical space and the second is management of the property (Note: this usually does not apply to pier and dock owners). Physical space can vary in size and functionality depending upon the needs of the tenant. Owners provide some degree of management of the rented space. This management can consist of any service necessary to keep a rented property in operation.

The provision of the physical space is typically not difficult to identify. Space is measured by the square footage of floor space. However, the management aspect can be difficult to identify. The management aspect is considered part of this industry if it is paid for, or provided by the owner. If the tenant reimburses the owner for a service, then it, too, is considered part of the output of this industry. In general, all management services that the owner provides to the tenant whether directly or indirectly through an outside contractor, are to be considered part of the output of this industry. For example, if an owner provides the daily cleaning to a rented office space, the service is considered provision of the space as well as the cleaning. If an owner provides utilities to a rented space (i.e. pays the utility bills), then the service output consists of provision of space and utilities.

## Pricing methodologies

### *General methodology*

The type of price collected for retail, office and industrial buildings is an average gross rent per **occupied square foot**. This price will measure what tenants in a particular building pay on average for their rented space. It is to be used when collecting prices for retail, office, and industrial buildings.

Average gross rent per occupied square foot was chosen as the type of price to collect because it eliminates the measurement of revenue fluctuations caused solely by changes in occupancy within a building. For example, in retail, anchors may not pay as much rent per square foot as other stores. If an anchor vacates a retail building then the price per *occupied* square foot could actually increase. This increase is an accurate reflection of price change. If the price per building, or gross leasable area (GLA) were to be collected instead, then there would be a decline in revenue or price. PPI should not reflect price changes simply due to changes in occupancy. Therefore, the rent per gross leasable area is not collected.

Average gross rent per occupied square foot is to be calculated in the following manner:

First, a building's gross rent for the month must be totaled. Gross rent is made up of a combination of all or any of the following rent components:

- *All base rents* - This is the fixed amount that tenants are required to pay for the renting of property. It is independent of any other expenses, and usually remains constant throughout the length of the lease.
- *All percentage rents* - This is a variable amount that retail tenants pay in addition to their base rent. Percentage rent is contingent upon retail sales, in that it is a percentage of a tenant's gross sales. The value to be included here is all percentage rents paid in the current month. This is not necessarily the same as all percentage rents earned in the current month (there is often a two month lag between when this type of rent is earned and when it is paid).
- *All storage rents* - These are any additional rents that tenants pay for the use of storage facilities within a building.
- *All parking garage rents* - These are rents that an owner receives from a tenant who rents a building's parking garage. This value is not to include any revenue that an owner receives from renting out individual parking spaces. Rather, it is to include only revenue derived from the renting of the entire facility to a tenant who then uses the facility to rent out individual

spaces. If the owner is involved in running the parking facility in any way, these rents are treated as miscellaneous receipts for Automobile Parking.

- *All escalations* - These are any adjustments made to base rents due to changes in the inflation rate or changes in the CPI index.
- *All operating expenses billed to the tenants by the owner* - This includes all operating expenses that tenants pay separately to the building owner (not an outside provider), and that are not included in the base rent. This total also includes those operating expenses that are "pass-throughs", whereby the tenant reimburses the owner for an expense. For example, if an owner is charged for utilities by a power company, but passes this expense along to the tenants, the amount that is passed on is to be included as operating expense revenue (provided the owner includes the operating expense revenue as revenue or income and deducts utilities as expenses). Examples of operating expenses may include any or all of the following: utilities, taxes, insurance, routine maintenance and repairs, and common area expenses.

Next, sum all rents, escalations, and operating expenses listed above and deduct the value of all concessions offered during the month. Concessions, or rental abatements, are inducements offered to tenants that directly or indirectly lower the actual rent. They are often offered when owners are prohibited from lowering rents due to the terms and conditions of a mortgage loan. Some common concessions include:

- *Signing bonus* - a tenant is given a sum of cash in reward for signing a lease with an owner. A tenant may receive \$5,000 as an incentive to sign a lease with an owner.
- *Moving allowances* - an owner reduces the burden of moving costs for a new tenant. This is done when an owner finances a portion of a tenant's moving expenses. For example, an owner may pay for the moving company when a tenant is ready to move into the owner's building.
- *Lease buy-out* - an owner assumes a tenant's unexpired lease. This is contingent on the tenant renting space in the owner's building. For example, an owner may pay off the rest of a tenant's lease in another building in order for that tenant to move into the owner's building as soon as possible.
- *Tenant improvements (TIs)* - an owner agrees to upgrade a space being rented by making a physical change to it. This is often necessary to meet the customized needs of a nonresidential building tenant.
- *Free rent* - a tenant receives a certain number of free months rent from the owner. This can be taken up front or spread out over the course of the lease. Free rent should already be accounted for in the total for all base rents because it is rent not received. Therefore, avoid double counting, and do not include free rent under concessions when it is already accounted for in the base rent. In cases where free rent is not accounted for in the base rent or in any other rent component, however, deduct its value along with the value of all other concessions offered during the month.

Finally, the building's total rent revenue (gross rent + operating expenses - concessions) is to be divided by the total occupied square footage in the building ("occupied" meaning rented). The resulting quotient will be the average gross rent per occupied square foot.

**Example:** In one month, building A collects \$300,000 in base rents, \$15,000 in percentage rents and \$45,000 in operating expenses for a total of \$360,000. In the same month, the owner of building A offers \$70,000 worth of concessions to the tenants in building A. The concession value is subtracted from the \$360,000 to obtain a net rent total of \$290,000. If the occupied square footage is 150,000 square feet, the average rent is \$1.93 per occupied square foot (\$290,000 divided by 150,000 occupied sq. ft.).

### ***Auditoriums, theaters, and convention centers***

Average gross rent per occupied square foot pricing strategy does not work well with auditoriums, theaters and convention centers. Since the quantity and type of tenants renting these buildings varies each month, and each with a completely different income and cost structure, it would be misleading to collect an average price that includes all tenants. Instead, collect the average gross rent per performance for these types of buildings.

To get this average gross rent per performance, one type of event must also be selected. Then, collect the value of all rent derived that month from all performances that are categorized as this type of event selected. Then, with these collected rents, an average price for this type of production can be tracked. For example, if the type of event selected is a rock concert, rent for rock concert performances would be collected. Then, with these rock concert rents, an average gross rent for rock concert performances would be calculated (the calculation would be as follows: total rents derived from rock concerts that month divided by the number of rock concert performances that month).

In getting this average price, however, recurring leases must be selected. These leases cannot be for one-time events. They must be for events that take place often enough to be reprisable, (i.e., at least once a year). Also these leases must have similar cost factors and pricing arrangements with other performances under the same event. Preferably, it is the same event that comes back at least every year, such as an auto show, Ice Capades, Ringling Brothers Circus or the NBA's Boston Celtics. For plays and musicals, look not only for similarity in costs, but also similarity in popularity.

Once selected, these leases must be priced. In other words, "gross rents" must be determined for these leases. Gross rents are the prices needed in order to come up with an average price for a particular type of performance. A gross rent for this property type is the sum of the following components:

- *Base rent* - The base rent is the fixed amount that a tenant is required to pay for renting the property. This amount is independent of any operating expenses and other variables, and usually remains constant throughout the length of the lease (it may, however, be adjusted in accordance with the CPI).
- *Operating expenses* - Operating expenses, or "house costs", refer to those costs to which the owner looks to the tenant for reimbursement. They are costs associated with the operation and production of an event, and that are paid by the tenant to the owner. Also known as "pass-throughs" (costs that are passed directly from the owner to the tenant), operating expenses usually generate no profit to the owner, but still are considered income

to the owner and part of the total rent. The tenant's responsibility in paying operating expenses is contingent upon what is previously negotiated in the lease.

- *Percentage of gross box office* - This refers to the portion of rent that is contingent upon box office sales. Under this arrangement, the tenant must pay a percentage of its gross box office revenue as part of its rent. The percentage charge will vary greatly, depending upon a tenant's base rent, past and/or expected gross box office volume and negotiations.

*Example:* In one month, the XYZ Theater leases its building for five musicals. From these musicals, this theater collects \$45,000 in base rents, \$18,000 in operating expenses, and \$9,000 as a percentage of the gross box office. The total rent collected from this event (i.e. musical) is \$72,000 for the month. Dividing the total rent derived from musicals by the number of musical performances gives the average gross rent per performance. This quotient is \$14,400. This means that the average gross rent per musical performance is \$14,400.

### ***Piers and Docks***

The type of price collected for piers and docks is the gross rent per acre. This price, unlike the previous two types of prices, is to represent just one tenant. Hence, it is not an "average" gross rent.

The gross rent represents the flat rental fee and the fee based on the amount of cargo throughput (that is, level of cargo tonnage handled) that is paid by a single tenant. To calculate the gross rent per acre, total both rent components (flat rental fee plus fees based on cargo throughput) and divide by the number of acres rented. The quotient is the gross rent per acre.

*Example:* In one month, the owner of pier A collects a \$150,000 flat rental fee from its tenant. In addition, this owner collects \$20,000 in fees based on the tenant's handling of 40 tons of cargo (\$500 per ton). The gross rent total is \$170,000. If the number of acres is four, the gross rent per acre is \$42,500.

#### **3.2.1.2 Service/Pricing Characteristics**

The following outlines price determining characteristics for all nonresidential buildings in this industry:

- *Location* - Nonresidential buildings located in areas conducive to their occupants' line of business generally receive higher average rents than their counterparts. Retail buildings, for example, located in heavily populated urban areas tend to receive higher average rents than retail buildings located in sparsely populated rural areas.
- *Quality of property* - Nonresidential buildings are classified according to their physical condition, amenities, and age. Classifications include Class A, B, and C with A being the highest classification, followed by B and then C.
- *Management intensity* - As the quality and/or quantity of services available to all tenants in a building increases, the average rent of a building increases as well. These services may include, among others, the following: security, elevator availability, and interior/exterior cleaning.

The following outlines additional price determining characteristics for specific property types in this industry:

- *Number of anchors (retail property)* - The average rent in a retail building (i.e. mall) is dependent upon the number of anchor tenants it houses. Anchor tenants are tenants that attract customers to a shopping center, and usually own the space they occupy. Because of these two factors, most anchors pay little or no rent, only common area maintenance and other operating expenses.
- *Level of sales (retail property)* - Retail tenants typically pay a percentage of their gross sales revenue as part of their rent.
- *Percentage of seats made available (theater/auditorium)* - Theater and auditorium property owners generally receive, as part of the rent, a percentage of a tenant's gross sales.
- *Number of berths (pier/dock)* - A berth refers to the space allotted to a single ship or vessel on a pier or dock. The number of berths measures how many vessels or ships can be present at one pier/dock at any one time. It is a measure of size.
- *Cargo throughput (pier/dock property)* - Rent for piers and docks is often dependent on the amount of cargo handled by the tenant.

### **Constant quality measurement issues**

In general, the methodology of pricing the average gross rent per occupied square foot provides a constant quality measurement over time that does not need further adjustments. Adjustments are only necessary if there are major improvements or changes to the building. These types of changes would require quality adjustment, but are rare. These changes would include major renovations or remodeling of a building or shopping center.

#### **3.2.1.3 Sample Unit Identification and Frame and Sampling Issues**

##### ***Office and industrial buildings and retail shopping centers***

For office and industrial buildings, and retail shopping centers, the leasing agents were clustered by leasing company and then leasing companies were sampled. Then the leasing agents were selected within the leasing companies. Then buildings were selected for the sampled leasing agents. Therefore, the sample unit is the leasing agent.

For all types of properties, disaggregation was performed to select the actual building(s) (or shopping center, etc.) for which data were to be collected. If part of the selected building is owner-occupied, that portion is not included in this industry and was excluded from collection.

The frame source for office and industrial buildings was a database provided by CoStar, one of the leading suppliers of real estate information in the industry. This frame was subsampled twice and clustered by leasing agent, who was the initial contact. Each cluster member is an individual building. The number of items assigned to the sample unit equaled the number of buildings.

For retail buildings, the frame source was the 2001 edition of the *Shopping Center Directory*. This frame was also subsampled twice and clustered by leasing agent. Each cluster member is

an individual retail shopping center. The number of items assigned to the sample unit equals the number of shopping centers

### ***Theaters, auditoriums, piers, and docks***

For theaters and auditoriums and piers and docks, buildings or structures were sampled. If the sample unit has only one building and that building has a different owner or leasing agent then, the building can be collected from the new owner or agent

The frame source for theatres and auditoriums was the QCEW. For piers and docks, the frame source was a dataset provided by the American Association of Port Authorities. This frame was not clustered and each port authority was given an individual chance of selection.

## **3.2.2 Offices of Real Estate Agents and Brokers**

### **3.2.2.1 Output Measurement**

#### **Output definition**

The primary output for real estate agents and brokers is the service of aiding a customer in the sale, purchase, or lease/rental of a property.

#### **Pricing methodologies**

The price collected is the dollar value of the commission computed as a percentage of the total selling price or total lease value of a residential or commercial property. The commission is specified in the listing agreement or in some other contract with the principal. It is also possible for the broker to receive a commission stated in terms of dollar(s) per square foot.

Initially, the sampled companies provide an actual sale price or lease value of a property recently sold or leased and the commission value. In subsequent months, using their expert knowledge of the current property market, these companies estimate what the price would be if the property was sold or leased in that current month.

If a broker is unable to estimate the value of the property, it is acceptable to report the commission for a comparable property sold during the current pricing period. This is not a substitution; it is just another method for estimating the price.

A flat fee will be collected for a discount broker. This is typically a list price.

### **3.2.2.2 Service/Pricing Characteristics**

The service to be priced is the sale or leasing of a property. Since the value of the property along with the commission rate determines the commission received by a broker, it is important to capture the price determining characteristics of the property. These characteristics include:

***Residential property***

- Type of dwelling – single family detached house, townhouse, apartment, etc.
- Property description – number of rooms, amenities, etc.
- Lot size
- Age of dwelling
- Utilities available – water, sewage disposal, etc.
- Garage
- Location –urban vs. suburban, proximity to schools and public transportation
- Improvements –new additions, significant repairs

***Commercial property***

- Square footage
- Type of building – office, retail, etc.
- Number of floors
- Location – central business district, etc.
- Location within building
- Amenities –health facilities, cafeteria, etc.
- Appurtenances – Rights to common areas, driveway easements, etc.

***Land***

- Size of lot
- Location –urban vs. rural areas
- Zoning – commercial vs. residential
- Development of lot – raw vs. finished
- Environmental features – lakes, timber, etc.

***Farms***

- Land use – crops, cattle, poultry, etc.
- Soil type
- Specialized facilities – dairy equipment, etc

**Constant quality measurement issues**

A primary concern in pricing brokerage is that the same property is not sold every month. Therefore, companies are asked to estimate the current property value given the current real estate market conditions. Real estate agents and brokers are considered the industry experts for providing current estimates of property value; therefore, a secondary source is not used.

Hedonic modeling is not possible due to the subjectivity of many of the pricing variables.

**3.2.2.3 Sample Unit Identification and Frame and Sampling Issues**

Many real estate companies tend to be national or regional with franchise or branch offices located around the country or region. Since pricing is tied to the local real estate market, each office was given a separate chance of selection as opposed to sampling the headquarters for all locations of a particular company.

The QCEW and a database provided by the Axciom Corporation were combined to form a frame for this industry. The sample was drawn by using Wage figures as a size measure for the

UI-based LDB strata, and by using estimated Revenue figures as a size measure for the Axiom strata.

### **3.2.3 Passenger Car Rental**

#### **3.2.3.1 Output Measurement**

##### **Output definition**

The primary output for the passenger car rental industry is the provision of various types of passenger cars, without drivers, on demand, for a short period of time, i.e. less than one year. The rental equipment is made available for use by individuals, corporations and the government for leisure, business and car replacement (insurance) purposes. The passenger cars are typically contracted for use on an hourly, daily, weekend, weekly and monthly basis.

##### **Pricing methodologies**

The type of price collected is the rental rate based on the duration of the car rental. Time based units of measure are expressed as per hour, per day, per weekend, per week and per month depending on the car rental company.

#### **3.2.3.2 Service/Pricing Characteristics**

The transaction that is priced is a single rental. Car rental agencies tend to design unique rate structures that are targeted at specific market segments. The following transaction characteristics are captured and held constant:

- Type of rate plan (e.g. standard, Internet, government, military)
- Duration of rental period (e.g. day, week)
- Class of rental vehicle (e.g. economy, compact, full size)
- Model of rental vehicle (includes model year, model, passenger count)
- Type of car rental Rate (e.g. hourly, daily, weekend)
- Type of car rental (e.g. local, one-way)
- Mileage terms (e.g. unlimited, flat fee per mile)
- Type of fuel plan (e.g. flat rate fuel charge, fuel purchase option)
- Additional/optional charges (e.g. additional driver, underage driver, late charge)

It is important to note that these pricing variables may not be exhaustive and/or universally applied.

##### **Constant quality measurement issues**

The characteristics of the rental transaction are held fixed allowing constant quality to be maintained over time.

#### **3.2.3.3 Sample Unit Identification and Frame and Sampling Issues**

The sample unit is either the headquarters of a national car rental company, a franchise, or independent rental company. The frame was the QCEW, which was stratified by type of

company. Identifying the national companies was not problematic. However, it was somewhat difficult to isolate the actual number of franchises.

### **3.3 Health Services**

#### **3.3.1 Hospitals**

##### **3.3.1.1 Output Measurement**

###### **Output definition**

The measurable output of the hospital industry is the total service package that a patient receives during their entire length of stay (i.e. admission to discharge). For an inpatient, these services may include room, board, medical supplies, drug treatments, medical & surgical procedures, and/or ancillary services. As for an outpatient, there would not be an actual admission to the hospital (i.e. length of stay is zero), therefore, the services an outpatient would receive would occur on a single visit to the hospital. Outpatient services may include treatments for minor injuries, minor surgical procedures, and/or ancillary services.

Hospital services are not consumed in a piecemeal fashion. Each piece is part of the total service bundle. Thus, our unit of measure is the entire length of stay. The hospital's output will be represented by the entire content of a patient's bill. Any items and/or services that are included on the patient bill are treated as part of the output and will be included in our repricing effort.

###### **Pricing methodologies**

The PPI program is interested in what a hospital actually receives (reimbursement) for their services not what they charge (price). The PPI's primary purpose is to capture reimbursement as the net transaction price. For the hospital industry, the PPI uses the word 'price' synonymously with the term reimbursement. The terms will be used interchangeably throughout this document. It should be understood that when the term "price" is used, what is actually being referred to is reimbursement.

The major types of reimbursement for hospitals are Diagnosis Related Group (DRG) case rates, per diem rates, and total billed charges (or a percentage of TBC). Capitation is currently not very prevalent among hospital reimbursement. We will collect a per member per month rate as well as the copayment amount and the number of visits per month (to measure utilization) for these contracts. In these cases, we will be repricing a population rather than a single patient treatment.

The simplest reimbursement method for a hospital is total billed charges. But it is also the least common. Most of the time, a percentage discount on total billed charges is paid. This percentage is negotiated between the hospital and the insurance provider before services are rendered and is often in effect for a year or more for a given covered population. In markets with heavy managed care penetration this form of reimbursement is not as likely.

Per diem rates are used frequently and are very easy to reprice. This type of reimbursement involves a per day payment for each day of stay in the hospital, regardless of actual charges or costs incurred. This per day rate depends on a number of factors. The two main factors are

number and mix of cases. Many times, multiple sets of per diem rates will be negotiated based on service type (e.g. medical-surgical, obstetrics, intensive care, neonatal intensive care, rehabilitation, etc.).

Originally DRG based reimbursement was for Medicare. It has since spread to the private sector. Today, DRG rates are widely used. There are publications of DRG categories, criteria, outliers, and trim points (i.e. the cost or length of stay that causes the DRG payment to be supplemented or supplanted by another payment mechanism) to enable the plan to negotiate a payment mechanism with the hospital for DRGs based on Medicare rates or in some cases, state regulated rates. Ultimately, the hospital and the insurance plan negotiate a rate (based on whatever criteria they choose) for each DRG they perform in that hospital.

Straight charges are the only exception to the reimbursement methodology. Basically, this is hospitals' list price for the service package provided. However, the actual amount that appears on a patient bill is rarely what a hospital will receive as payment. In some cases, a hospital will receive the list price as its reimbursement. In these instances, this is what we will collect as our net transaction price.

### **3.3.1.2 Service/Pricing Characteristics**

The major price-determining characteristics for hospitals include:

- Diagnosis Related Group, or DRG (inpatients only)
- Principal diagnosis
- Principal procedure
- Type of payer
- Length of stay, or LOS (inpatients only)

These characteristics are the main components of the total service package that a patient receives during their entire length of stay (i.e. admission to discharge). The two most important are the DRG and the type of payer. The DRG is the basis for repricing in general medical and surgical hospitals, whereas the principal diagnosis is used for psychiatric hospitals and most specialty hospitals. The type of payer, depending on whether it is Medicare, Medicaid, private third party, or self-pay, dictates the payment arrangement (type of reimbursement).

Initially, for general hospitals and children's hospitals, random sets of DRGs are pre-selected for collection at each individual hospital. These DRGs are listed on an item assignment sheet (IAS). This lists the unique combination of DRGs to be collected at each hospital. The IAS will also list several alternative DRGs that can be used if one of the targeted DRGs is not available at a particular hospital. Within each DRG, there are ICD-9-CM codes that pertain to diagnoses and procedures; this is where the principal diagnosis and principal procedure fall. The principal diagnosis refers to the condition that is chiefly responsible for causing the admission of the patient to the hospital for care. The principal procedure is the procedure that was performed for definitive treatment rather than one performed for diagnostic or exploratory purposes or was necessary to take care of a complication.

### **Constant quality measurement issues**

A concern in pricing hospitals is the change in treatments over time. Improvements in medical technology, new procedures, or new drugs can impact treatments in terms of the length of hospital stay, the types or amount of drugs administered, or treatment outcome. It is difficult to

determine when such a change is a change in quality or a pure price change. A price change associated with a change in treatment that results in the same outcome would be treated as a pure price change. However, if a new treatment is developed with substantial differences in outcome, a quality adjustment may be warranted. An example is replacing a surgical treatment with a drug treatment that produces a different outcome.

Currently, the PPI is researching potential quality adjustment methods similar to those described below for nursing care facilities.

### **3.3.1.3 Sample Unit Identification and Frame and Sampling Issues**

The types of hospitals sampled include general medical and surgical, psychiatric, and specialty hospitals. The sample unit is a single hospital, not a hospital system. Hospitals within a system were given separate chances of selection.

The source for the frame for hospitals was the American Hospital Association. The data is from the 1998 release of the Healthcare QuickDisc database, which uses data from the 1997 Annual Survey of Hospitals.

According to the industry definition, all federal hospitals should be included in these industries. However, since no measurable economic transaction occurs in these hospitals, all federal hospitals have been excluded from the frame. Hospital units of institutions have also been excluded from the frame because they are part of other industries.

Revenue was not available at the hospital level, so admissions were chosen as the measure of size for all three industries. It is believed that total facility expenses are a good proxy for revenue, as a majority of hospitals are non-profit. However, the response rate for this variable was only 78 percent. Since total facility expense is highly correlated with admissions, and the response rate for admissions was 86 percent, it was chosen as the measure of size. Because a value for total beds was available for each record, the missing admission values were estimated using average admissions per bed and number of beds.

## **3.3.2 Nursing Care Facilities**

### **3.3.2.1 Output Measurement**

#### **Output definition**

The primary output for establishments in this industry is defined as all care and services that are provided to the resident by the nursing home. Care is usually classified in three general levels, from minimal nursing care (perhaps just administration of medication) to more intense nursing services, such as round-the-clock monitoring. Medical care typically consists of nursing care; physical, speech or occupational therapy; drugs; blood; medical supplies such as splints or casts; and the use of durable medical equipment. Other incidental medical services would include dental, social, dietary, or psychiatric services. Also included in the output would be the cost of meals, and other "convenience items" such as use of the telephone, laundry services, newspaper, or television.

Nursing homes may also provide social services such as social work services, recreational activities, beautician or barber services, and chapel services. Nursing homes may contract out

for physical therapy, occupational therapy, oxygen supply, beautician services, etc. Any services provided by and reimbursed to specialists on contract with the facility are not to be included in primary services. Most nursing homes have contracts with outside pharmacies to supply medications. However, if the establishment does operate a pharmacy, the pharmacy activity is not included as output.

Nursing homes typically bill for services on a per diem or daily rate basis. Depending on the facility, different items are included in the per diem charge. For example, some facilities may include the price of a private television in the per diem rate, while others may bill for it separately. The items that may be billed separately can range from specialized nursing care (such as hand feeding), to basic care like a visit by the beautician. A private room may have a different per diem rate than a semi-private room. 24-hour on-call service from a physician may elicit an additional fee or may be included in the per diem rate. However, if the resident's physician conducts an examination or other medical service at the nursing home, the physician will bill for this service on his/her own. This would represent revenue for this industry.

### **Pricing methodologies**

The type of price in a nursing home will be collected on the bill. That bill may be for the entire episode within the nursing home, or an interim bill of monthly services (for those patients needing continuing care). In either case, the bill will contain their daily rate applied to their number of days in the facility, and additional charges not included in the daily rate. The daily rate is called the per diem rate. While this is the industry standard, items and services included in the per diem rate can vary by facility and payer type.

Medicare, Medicaid, and private insurance reimburse using the per diem structure. However, it is possible that the rate charged to out-of-pocket payers could be a measure other than daily (for example: an hourly rate). In addition, the facility may have a billing period that is weekly rather than monthly. The price that represents the entire stay or the interim billing period, whichever is shorter, is collected to measure the output of this industry. In the case that an interim billing period is a week, the per diem rate times the number of days in the facility and any additional line item charges for that week would be collected. As with all rates, the services and items that are included in the rate, as well as services and items that are not included, must be provided.

When information is collected at the corporate setting, patient bills may not be accessible, and collection may be limited to only the per diem rate. Other acceptable prices include an hourly or monthly rate, total billed charges, or an estimated net price. Current average prices are not acceptable because they cannot represent one unique patient and treatment path.

#### **3.3.2.2 Service/Pricing Characteristics**

The nursing home industry has its service lines best defined by the payer of services. The two major types of payers are public payers and private payers.

Public payers can be separated into two main categories, Medicare and Medicaid. Medicare is a federally funded program for persons over age 65. It pays for short stay visits in a nursing home where the patient receives rehabilitation and expects full recovery and discharge. Medicare does not pay for nursing home residents who do not expect discharge from the facility. Medicaid is a State administered, jointly funded (Federal and State) program for the indigent. Medicaid is designed to pay for the care of long-term patients (those not expected to recover

enough to leave the facility) that have exhausted their personal income. There are other public payers that represent a small portion of the industry.

Private payers can be separated into two main categories, private insurance and out-of-pocket. When the patient has private insurance, or long-term-care (LTC) insurance, it pays a portion of their nursing home expenses. This type of insurance is becoming more common, since health care costs have risen. Out-of-pocket payers, as the name describes, are the patients or families of the patients making direct payment for the care. Philanthropic or charitable payers are other types of private payers, but represent very small portions of the industry.

### **Constant quality measurement issues**

The PPI Program currently adjusts items in the nursing care facilities industry based on one of the quality indicators published by the Department of Health and Human Services for that industry. The quality indicator measures changes in nurse staffing levels for each nursing home. A positive correlation between nurse staffing levels and the quality of services provided by nursing homes was demonstrated before any steps were taken to quality adjust the nursing care facilities index. While nurse staffing is only one of many complex factors that impact the quality of nursing care facilities services, analyses by the Institute of Medicine (IOM), the Centers for Medicare and Medicaid Services (CMS), and the General Accounting Office (GAO) point to nurse staffing as a key factor in determining the quality of nursing care facilities care. A dollar value can be assigned to changes in nurse staffing levels using BLS wage data.

#### **3.3.2.3 Sample Unit Identification and Frame and Sampling Issues**

An individual nursing care facility is the sample unit for this industry. The QCEW was used as the sampling frame.

### **3.3.3 Offices of Physicians**

#### **3.3.3.1 Output Measurement**

##### **Output definition**

The output of this industry is the medical services and treatments provided by a physician. When the buyer is purchasing the services one at a time, the buyer reimburses the provider on a fee-for-service basis. The output of this industry, in a fee-for-service setting, begins when a patient enters the establishment, and ends once medical services are provided. If a buyer pre-purchases care for a group of persons the type of payment is called capitation. The output of this industry, on a capitated basis, begins when a person chooses to be a member of a physicians population, and continues until the person is no longer a member, and is no longer the treatment responsibility of the physician.

##### **Pricing methodologies**

There are currently three different types of reimbursement for providers (i.e. prices). They are total billed charges (i.e. fee-for-service), discounted fee-for-service, and the capitated rate. Discounted fee-for-service arrangements can be presented as the contracted reimbursement or the expected reimbursement (anticipating a later payment). Fee-for-service, as the name suggests, is a reimbursement for the charges of services that have already been rendered. This

method of reimbursement is associated with indemnity insurance including Blue Cross/Blue Shield. Discounted fee-for-service falls under the same definition with a contracted reduction of the original charges. This type of discount is either a percentage reduction of the charges or a negotiated fee. These types of contracted arrangements are usually associated with Medicare Fee Schedule payments or Managed Care Organizations. When the reimbursement to the physician does not involve any type of third party payer, total billed charges will be the type of price with self-pay being the type of payer. Finally, capitation is the prepayment, by the Managed Care Organization (typically an HMO), for the average monthly services of a group of plan members (population). Capitation is the pre-purchase of a month's worth of health provider services.

A net transaction price will be the preferred price to collect for all methods of reimbursement except capitation. That is, the actual billed price on the patient's bill less any discounts offered to that patient. A net transaction price for this industry may be a combination of many fees incurred during a patient's visit. Most often, a payer will have negotiated a fee schedule (which would qualify as a negotiated contract price) with the physician or the clinic and the fee on that schedule for the service provided will be level of reimbursement or price for that service. If the physician has agreed to accept this fee as payment in full, then that is our net transaction price. In this case, some type of contract identifier will be used so that the same contract can be repriced over time.

In the case of fee-for-service arrangements, the actual billed charges will be the net transaction price. The total billed charges listed on a patient's bill acts as the list price. This price is acceptable if the patient is responsible for payment (no other payers, discounts, or other fees apply, i.e. self-pay), or the insurance, which has no contractually negotiated discounts, pays its portion, with the remainder balance billed to the patient. In either way the total charges are not discounted.

Global fees are also a type of price or reimbursement that may be encountered. These types of fees, generally surgical, include services from some time before the procedure itself is performed until some time afterward.

Capitation, as a type of global fee, is a prepayment for services instead of a reimbursement. The price that will be collected for capitation will be the per member per month (PMPM) rate. This price will represent a unit of the total transaction (which can change due to the population size). In addition, the copayment per visit will be captured and factored into the price by multiplying it by the number of monthly visits at the time of collection divided by the member population. This equation for the copayment surcharge is shown below.

$$\text{Copayment surcharge} = \frac{\text{Copayment per visit} \times \text{Number of monthly visits}}{\text{Number of members in plan associated with practice}}$$

Other elements that help to explain the price are the professional and technical components (i.e. especially in radiology and anatomic pathology procedures). The technical component is for the actual procedure that was done and the professional component is a fee charged by the physician.

Outpatient care facilities especially, may provide prices that include both a professional fee for the actual treatment and a facility charge. Again, these should be added to produce the net transaction price.

Average prices for physician services are not acceptable because an average could incorporate many different types of payers. Also, an average price in an industry where no two services are alike (because every patient is inherently different and, in most cases, services provided to those patients will never be exactly alike) would not be repriceable because the service bundle would change every time a price was reported.

### **3.3.3.2 Service/Pricing Characteristics**

Initially, a patient's bill for treatment is collected and items included in that bill are held constant over time. The amount of care may be a complete treatment, including more than one office visit, diagnosis, or procedure. In the case of a treatment whose price is a global fee, all procedures and treatments must be included in the fee (i.e. an initial office visit, a diagnosis, a surgical procedure, and a follow up visit could all be included in the fee). All of the services involved must be listed if a global fee is listed as the net transaction price. In addition, the treatment being collected does not necessarily have to be performed on the premises of the collected establishment. Some doctors perform surgery in places other than the establishment with which they are financially affiliated (e.g. hospital). Some may even visit a patient in a nursing home facility. Revenues generated in this manner will be included in the total revenue of the collected establishment.

In the case of a fee-for-service arrangement, both the patient's bill (collection of all of the individual line items included on a patient's bill even if we cannot obtain a copy of the actual bill) for the treatment he or she received and any other fees that were incurred during the patient's treatment will be collected. One example of this type of fee would be a facility charge for the use of the facilities within an ambulatory care center. In order to accurately measure what was actually done to the patient, all procedure (Current Procedural Terminology 4th edition - CPT-4) and diagnosis (International Classification of Diseases 9th revision - ICD-9) codes that apply to the patient will also be collected.

For capitation, the contract (which describes the expected utilization using specific procedure codes and population characteristics) will be collected as a single global fee. The capitated fee (plus any additional fees, copayments, which might go along with a particular treatment) will represent the revenue generated in offices and clinics of doctors of medicine.

### **Constant quality measurement issues**

As stated previously, a patient's bill is collected and held constant over time. With all types of health services, there are inherent problems with this methodology. First, treatment is never the same between two patients with the same condition. However, the standardization of procedural terminology allows for consistency of billed services. Therefore, substitutions should only be necessary if new procedures replace current procedures to increase effectiveness. This type of adjustment is not likely.

Substitutions are more likely to occur when a particular insurance or health plan is no longer accepted by the provider. This requires a link to show no change to account for differences in the prices of the different health plans. However, during such substitutions it is recommended to substitute using a health plan with the same method of reimbursement. Otherwise method of reimbursement should remain constant.

Changes across payer type should not be common. In fact, they should only occur when a contract is completely terminated. For instance, a physician may decide to stop accepting

Medicaid patients so an attempt would be made to collect the same treatment with a different type of payer.

According to the Health Insurance Association of America (HIAA), payer contract changes occur approximately once a year. These changes are most often the result of private insurance companies' annual renegotiations. In addition, Medicare updates its fee schedule every January.

Although the specialty of the physician is a price determining characteristic, the specialty of the physician is unlikely to change. Physicians rarely change specialties and they also rarely change geographic location. Because of this, these two price determining characteristics should not be the cause of service substitution or quality adjustment. In fact, the Medicare Fee Schedule includes no differences in the fee schedule across most specialties.

The health outcomes of physician's patients will not be assessed. For the BLS, "quality" will refer only to the (producer) cost of providing the selected service bundle to the patient. Differences in quality and competence among physicians are extremely difficult (if not impossible) to measure accurately, so these measures will also not be included in the index computation.

### **3.3.3.3 Sample Unit Identification and Frame and Sampling Issues**

The sample unit is a solo or group practice.

The AMA Physician's Masterfile and the Group Practice File were combined as the sample frame. These files were chosen because they are more complete than the QCEW, and they include number of physicians, which is a better proxy for revenue than is total employment. In addition, each record identifies the primary specialty of the solo physician practice or group practice.

The Masterfile, consisting of solo practices, was explicitly stratified into the eight single specialty categories. In addition, a stratum was formed to include physician records for which a primary specialty was not identified.

The Group Practice File was explicitly stratified into seven single specialty and one multispecialty categories. Doctors of Osteopathy were not available in the Group Practice File. As with the Masterfile, an additional stratum was created for group practice records with no primary single specialty indicated. In addition, a stratum was formed for records for which the specialty composition was not indicated (i.e., single or multispecialty).

## **3.4 Retail and Wholesale Trade**

### **3.4.1 Retail Trade**

#### **3.4.1.1 Output Measurement**

##### **Output definition**

The primary output of retail trade industries is the provision of the marketing functions necessary to allow consumers access to purchase various goods. In contrast to wholesale trade

industries, customers are able to make unit purchases of items (i.e. not required to buy in bulk), that are generally packaged in some manner. Basic functions involved in the marketing process include standardization or grading, storage and transportation, buying, risk bearing, financing, selling and product planning. The selling function is probably the most obvious one seen by the consumer. Selling includes the pricing of the product and the presentation. Presentation includes activities such as tagging, packaging, display, space allocation, advertising, and promotion.

Retail establishments are classified into a specific industry by kind of business according to the principal lines of commodities sold (groceries, hardware, etc.), or the usual trade designation (drug store, cigar store, etc.). Once the industry classification is determined for an establishment, the sale of any margin product (goods bought by the retail store and resold to a household consumer) is considered primary production to the establishment. This is because industry classification is determined by type of store and the exact same product can be found in establishments classified in a number of retail industries. This is an exception to the general rule of classification of products found in the PPI. However, since what is being measured in retail trade industries is the service in delivering these goods to the public, this procedure is appropriate. A retail store may also sell goods to businesses, but as long as an establishment markets itself to the general public, it is classified in retail trade. This guideline holds even if the majority of the establishment's sales receipts are from wholesale transactions. It is generally recognized that if a store considers itself a retail establishment, then the retail activity carries over to intermediate users as well as final consumers. In addition, services incidental to the sale of goods (e.g. delivery of groceries) are considered primary production of the establishment.

## **Pricing methodologies**

The type of price collected in retail trade industries is a margin price (with the exception noted below). The margin price is calculated by taking the selling price and subtracting the purchase price of the last shipment received (less all rebates and allowances) for a specific good. National income accounting conventions also define the output of retail trade as the margin. The Bureau of Economic Analysis defines this as the selling price of a good in the retail market less the cost of replacing the good in the store's stock. This definition is difficult to operationalize because it requires collecting the replacement cost of the item. It is far easier to use a Last In First Out (LIFO) accounting methodology, that is, using the last shipment received for pricing the acquisition cost of the sold item.

Two approaches have been used in the margin pricing methodology. The preferred approach is to collect the average margin value of a relatively homogeneous grouping of products. In this case, while store characteristics may better explain changes in margin, the concern with this approach is that the grouping may be affected by product mix. The other approach is to collect the margin price of a unique product. This "sample of goods" approach is used to represent the output of the entire store. One concern with this approach is that the marketing of the selected sample of goods may not always be representative of the marketing of other goods sold in the store. Using this approach, changes in store characteristics may not explain changes in margin for the selected sample of products

An exception to the margin price methodology occurs in some limited cases. Certain transactions are priced using the total retail sale price of the good sold. This is mostly due to the large value added to the product in preparation for sale or a fee for a service where the customer is clearly paying for something incidental to the sale of goods. Examples include

sales from in-store restaurants run by the retail establishment, alterations of purchased goods, and delivery charges incidental to the purchase of a good.

### **3.4.1.2 Service/Pricing Characteristics**

There are a variety of price determining components that are applicable in the retail trade industries. They include the type of product, size/weight, and often, material composition. In addition store characteristics associated with providing the service are also collected or assigned to sample units based on secondary source data. These can include characteristics such as the store area, number of available choices of products, the existence of scanners for processing customers and age of scanner software, and the hours of operation.

### **Constant quality measurement issues**

A fundamental issue in pricing retail trade industries is quality adjusting changes in store characteristics. If store characteristics change, all items being priced from that location have to be adjusted to account for changes in the service provided that are related to a change in store characteristics. Hedonic models should be able to quantify the correlation that exists between store margins and store characteristics.

Store characteristics collected by BLS include:

- Total store area
- Selling area
- Checkout scanners
- Age of scanner software
- Number of stock keeping units
- Number of full-time-equivalent employees
- Type and location of store
- Hours of operation
- Total sales volume
- Time since last renovation

Although the above characteristics are often readily available from sample units, a transformation of data elements may increase the precision of measure in hedonic models. An example is a ratio of checkouts to store traffic (more checkouts per customer indicate better or faster service all else equal).

Other ratios to include:

- Checkouts/sales
- Employees/sales
- Stock keeping units/store area
- Employees/store area
- Checkouts/store area

A retail store is considered to be providing the same service activity when slight modifications are made to the product.

### 3.4.1.3 Sample Unit Identification and Frame and Sampling Issues

First stage sampling (sample unit selection) is based on sales data which is most often available for large retail trade industries or when sales data are not available, on employment size which is most often the case for small industries. Both measures are used as a proxy for margin revenue in a probability-proportionate-to size sample. The sample unit is the headquarters location.

Second stage sampling (item selection) is based on margin dollars.

## 3.4.2 Wholesale Trade

### 3.4.2.1 Output Measurement

#### Output definition

Wholesale output can be defined as the efficient transfer of goods from the manufacturer to another party for the strict intention of resale. Sample units that produce this output have two primary functions including 1/ the creation of utility (or efficiency) and 2/ a channeling function. The utility function mentioned above has several parts to it including the creation of time and place utility and making products available when and where customers are likely to find them. Wholesalers also create possession utility, allowing their customers to take ownership of products as needed. Finally, wholesalers also provide information utility, providing details about the products that they sell.

The above definition also includes a channeling component, which is not as easy to describe. The channeling function has many parts to it whereby the wholesaler performs one or more of the following functions:

- *Selling and promoting* - wholesalers' sales force help manufacturers reach small customers at a low cost. In this channeling function, the wholesaler has more contacts and is more often trusted by the buyer than the distant manufacturer.
- *Buying and assortment building* - wholesalers can select items and build assortments needed by their customers, thereby providing a "one stop shop" for a buyer.
- *Bulk breaking* - wholesalers save their customers money by buying in carloads and breaking these large lots into smaller quantities.
- *Warehousing* - wholesalers hold inventory, thereby reducing the inventory costs and risks of suppliers and customers.
- *Transportation* - wholesalers typically provide quicker delivery to buyers because they are closer to the buyers than the manufacturer.
- *Risk bearing* - wholesalers absorb risk by taking title and bearing the cost of theft, damage, spoilage, and obsolescence.
- *Market Information* - wholesalers give information to suppliers and customers about competition, new products, and price developments.

- *Management services and advice* - wholesalers often help customers train their sales clerks, improve store layouts, and displays, and set up accounting and inventory control systems.

Wholesalers also may perform installation services, equipment repair work, as well as warranty repair work for the manufacturer. All of these services are not considered to be part of this industry, are generally not bundled with the wholesaling function and if selected during disaggregation, should be collected as an other receipt.

## **Pricing methodologies**

Margin prices are the most prevalent type of price for merchant wholesalers. Dollar value of commission based on a percent of sales is the most prevalent type of price for agents and brokers and for manufacturers' sales and branch offices that do not take title to a good.

### ***Margin prices (merchant wholesalers)***

The type of price collected in goods merchant wholesale is typically an unlagged average margin price. Margin is a combination of two different parts; one is the incoming acquisition price from the manufacturer and the other is the selling price to the next level buyer; the difference between these two prices is called the gross margin. The first part of the price, the acquisition price, represents how much the wholesaler paid for an item from the supplier. This acquisition price represents the direct cost of the wholesaled goods and should exclude freight whenever possible (freight should be FOB or if delivered based on a minimum). The price should include point-of-sale incentives (taken as discounts) that may be applied to the merchandise whenever possible.

There are five different margin prices in this industry. They are prioritized below.

1. Average gross margin per unit for a comparable customer class and/or supplier class for all sales within a comparable product line.
2. Average gross margin per unit for all customers and/or suppliers for a comparable product line.
3. Average gross margin per unit for a particular customer class and/or supplier class for all sales of a particular product.
4. Average gross margin per unit for all customers and/or suppliers for all sales of a particular product.
5. Gross margin for a single specific product transaction.

Agents and brokers and manufacturers' sales or branch offices that take title to a good can also have margin price transactions.

### ***Dollar value of commission prices (manufacturers' sales and branch offices)***

Agents and brokers and manufacturer's sales and branch offices typically receive a commission fee for their service. The commission is the amount of money that the sales office receives (not an individual agent) for performing the service. Five percent of the per unit sales prices is a

typical sales office commission percentage, although this can vary. Since revenue figures are typically recorded in terms of sales dollars for this industry, the total dollar value of commissions is a result of multiplying total sales dollars by the average commission percentage.

There are also five different types of dollar value of commission prices prioritized below.

1. Average dollar value of commission per unit for a comparable customer class for all sales within a comparable product line.
2. Average dollar value of commission per unit for all customers for a comparable product line.
3. Average dollar value of commission per unit for a particular customer class for all sales of a particular product.
4. Average dollar value of commission per unit for all customers for all sales of a particular product.
5. Dollar value of commission for a single specific product transaction.

Merchant wholesalers, agents and brokers, and manufacturers' sales and branch offices do not typically price their services based on a flat fee commission price. However, in the event that they do, a *flat fee for a single specific transaction* is collected.

### **3.4.2.2 Service/Pricing Characteristics**

There are a variety of price-determining components that are applicable in all of the wholesale trade industries and they include:

- *Product Information* - The type of product purchased is one of the largest price determining components. Products differ by cost, size, color, as well as many other category differences. Products also differ by demand, which can be a large price determining component when similar products are sold. Products also might differ by the amount of additional services that are added to the product while on the premises of the wholesaler. They are generally considered incidental to the wholesaling operation and do not change the function of the product.
- *Buyer Sales Information/ Supply Source Incentive Information* -This price-determining component is also important on both ends of a wholesaler's transactions because price breaks from supplier to wholesaler and from wholesaler to the next level buyer are frequently based on volume. Consequently it is important to identify the sales volume where these price breaks occur.

### **Constant quality measurement issues**

By pricing average margins, constant quality is maintained and no further adjustments are necessary.

### **3.4.2.3 Sample Unit Identification and Frame and Sampling Issues**

The QCEW was used to sample these industries. For first-stage sampling, the three-digit NAICS level was used due to problems with the NAICS treatment of wholesale trade. Second-stage sampling was based on margin dollars.

## **3.5 Information and Communication**

### **3.5.1 Newspaper and Periodical Publishing**

#### **3.5.1.1 Output Measurement**

##### **Output definition**

The output of the newspaper publishing is the publication of intellectual content in the form of a newspaper. A newspaper is a regularly issued publication printed on newsprint and containing news, commentary, feature articles, photographs, and/or advertising of interest to the general public

The primary output of the periodical publishers is intellectual content delivered in set intervals at least once a year. The most common formats for periodicals are magazines, newsletters, abstracts, and journals, either in hard copy form or online.

##### **Pricing methodologies**

The output of both industries can be measured in two ways; through the direct sale of the publication through subscriptions and single copy sales, and indirectly through the sale of space in the periodical to advertisers who want to reach the audience of readers.

##### ***Subscriptions***

The preferred price for subscriptions is an average price. The item selected should reflect a specific duration of subscription (such as 52 week, 26 week, 13 week) and frequency of delivery (daily, weekly, etc.). The revenue for all newly transacted subscriptions of the selected duration and frequency will be divided by the number of these units delivered. This number of units delivered is not necessarily the same as the number of subscriptions sold because it can include free and/or promotional copies.

If it is not possible to get an average as stated above, it is acceptable to collect an average percent discount if this figure is tracked by the respondent. The average discount is calculated by comparing the actual revenue received for subscription transactions to the revenue that would have been received if every subscription was sold at list price. If this is selected, the average discount will be applied to the list price for the subscription chosen and the price will still be noted as an average price.

If average prices cannot be provided at all, it is acceptable to collect an actual transaction price for a single subscription.

### ***Single copy sales***

An estimated transaction price is the only price for a single-copy sale. Each single-copy sale transaction represents a unique deal with a specific wholesaler or distributor. One such transaction should be selected. In the ensuing months, the features of the contract should remain fixed, and the respondent should estimate the price that would be received if a similar deal were to be transacted in the current month.

### ***Advertising***

The preferred price for virtually all advertising is an average price. This average price should always refer to the ads of a specific type and size that appeared in the publication during the pricing period. Depending on the respondent's preference, the pricing period may be the most recent week or another defined period. Advertising average prices may be collected with an average discount, or by dividing the revenue collected from the sale of all ads of the specified type and size by the number of these ads that were published during the defined time period. The average discount is calculated by comparing the actual revenue received for sales of advertisements of the selected type and size to the revenue that would have been received if each of these advertisements were sold at the listed rate card price. The average discount should be applied to the rate card price to get the final price to be tracked.

Lagged average prices are not acceptable. The collected average should refer to ads published during the pricing month. If average prices cannot be provided at all, it is acceptable to collect an actual transaction price.

For newspapers insert ads, the preferred price is an actual transaction price.

#### **3.5.1.2 Service/Pricing Characteristics**

The two primary services to be priced are circulation and advertising.

### ***Circulation***

Circulation can be classified into two categories, subscriptions and single-copy sales.

Subscription prices depend on the frequency of delivery (e.g. daily, daily and Sunday, monthly, quarterly) and the duration of the subscription (13 weeks, 26 weeks, 52 weeks).

For periodicals, the term 'single-copy sales' is misleading because virtually all publisher revenues in this area do not derive from sales of single issues. For publishers, this service area refers instead to the publishers' sale of bulk amount of periodicals to wholesalers and distributors who resell these items to retailers (primarily newsstands, bookstores, and grocery stores). In some cases, a publisher may bypass these middlemen and sell their products directly to the retailers, but this is fairly uncommon.

### ***Advertising***

Newspaper advertisements account can be classified into four categories:

- *Display ads* = These ads are generally purchased by companies rather than individuals. Their price is determined based on the amount of space in column inches, the type of

graphics, and the number of colors used.

- *Classified ads* - These ads appear in smaller typeface and are frequently called the “want ads”. These ads are purchased by companies and individuals. Color is generally not an option when printing classified ads, so the size of the ad is the main price determining characteristic. The sizes of these ads are measured in terms of their line count.
- *Insert ads* - These ads are printed apart from the regular press run and then inserted among the regular newspaper sections. They are purchased mostly by national chain stores and the price is determined by the number of pages, the quality of the paper, the quality of the graphics, and the number of colors used in printing.
- *Internet ads* - These ads appear in the online version of the newspaper only. They are generally purchased by companies rather than individuals. Their price is determined based on the height and width of the ad (typically measured in pixels), the type of graphics/fonts, display time, and the position of the ad on the screen (i.e. top banner, side banner, etc.).

### **Constant quality measurement issues**

Quality adjustment may be needed for subscription transactions when the frequency of delivery changes. Quality adjustment may also be necessary for advertising transactions when there is a large change in publication frequency or circulation.

#### **3.5.1.3 Sample Unit Identification and Frame and Sampling Issues**

##### ***Newspaper Publishers***

Newspaper publishers take several different forms. These establishments may be small local newspapers, regional newspapers or national newspapers. In general, the headquarters of the newspaper is where the records are available.

##### ***Periodical Publishers***

The sample unit for periodical publishers is an individual periodical title, and not the entirety of activities of the publisher.

This sample was selected through a two-stage sampling process. In the first stage, publishing companies were selected from the QCEW. Wages were used as the size measure in this first stage. Each unit was assigned a number of magazine titles to be subsampled. The largest units were assigned multiple titles, but the majority of companies were assigned a single title only. These titles are the sample units and were selected from a secondary frame source, Mediafinder.

We chose to sample by title because it would be very difficult to accurately represent all of the activities of an entire publishing company in one sample unit with a reasonable number of items. The two-stage process of selecting titles was chosen because the alternative frame proved to be unreliable in providing consistent, comparable circulation figures across companies.

## **3.5.2 Software Publishing**

### **3.5.2.1 Output Measurement**

#### **Output definition**

The primary output of this industry is the provision of computer software and related services to ensure the successful use of the software.

Software publishers sell software licenses which grant customers the right to use programs designed and developed by the software publisher. These programs are standardized software solutions; each customer purchasing the software receives a program providing the same features and functionality. This is in contrast to custom software in which unique programs are developed and designed to meet the individual needs of each client. Along with software licenses, software publishers also provide related services for their software products such as technical support, product updates, software maintenance programs, consulting, software implementation services, and training services.

Software may be designed for use on personal computers (PCs), servers, cell phones, personal digital assistants (PDAs), game consoles, and a variety of other computing devices.

Software falls into two main categories based on how it is transacted. Mass produced software marketed to the general public is referred to in this study as “packaged software”. Software that is designed for business and institutional clients is typically server based, and is referred to in this study as “enterprise software”.

A software model gaining more attention in recent years is open source. Unlike traditional software licenses, open source software source code can be copied, altered, and redistributed free of charge. Open source software vendors typically distribute free software programs to their customers and earn revenues by providing support services, such as implementation or consulting, for their software.

Software applications accessed over the Internet from servers not located at the clients’ site as well as those pre-installed on a hardware device are not primary to this industry.

#### **Pricing methodologies**

The method of collecting prices depends on whether the software is considered enterprise software or packaged software.

#### ***Enterprise software***

Enterprise software licenses are typically sold to businesses, institutions, or value-added resellers and are not mass marketed to the general public. The enterprise software category also includes flat fee site licensing agreements. The preferred price is an average price calculated by dividing the total revenues earned from the sale of a particular software product sold to a particular client type (end user, retailer, wholesaler/distributor, or OEM) by the total number of these licenses sold to these clients within a specified period.

Each month or quarter, many enterprise software publishers calculate an average percentage by which their final selling prices fall short of the list prices for each of their products. This calculation is known as the average discount off the list price. For enterprise software transactions, the average price will be calculated by applying this average discount to the list price of a selected transaction.

The average discount should be calculated based on all transactions of the selected software product which occurred during a specified time period. However, if a firm cannot provide this, it is acceptable to collect an average discount that is based on all transactions for the type of software that matches the one that has been selected. For example, if a transaction of Database software product A is selected, an average discount based on all Database software product A transactions should be applied to the list price. However, if the respondent only maintains average discount data for all of their database product transactions together (and not one for product A transactions only) it is acceptable to apply this average discount to the list price of the selected transaction as well.

Virtually all enterprise software transactions require the purchase of first year maintenance with the purchase of the software license. As a result, the collected transaction should consist of both the license prices (including all client and server licenses sold as part of the transaction) and the price of first year maintenance, even if the purchase of first year maintenance is optional. This is because virtually all enterprise software licenses are offered in conjunction with first year maintenance for one single negotiated fee.

If an average price cannot be collected, it is acceptable to collect an estimated transaction price for enterprise software transactions. A typical, recent enterprise software transaction will be chosen, and each month during repricing the respondent will estimate the selling price for that particular transaction to a similar client. The collected transaction should consist of all client and server license prices and the price of first year maintenance.

### ***Packaged software***

Packaged software licenses consist of mass produced software marketed to the general public. Packaged software can be purchased at retail locations or through the Internet via online stores. Buyers of packaged software include households, computer hardware manufacturers (OEMs), retailers, and distributors or wholesalers. Packaged software transactions may involve the purchase of one license by a household buyer or may involve the purchase of hundreds of individually priced licenses by a retailer or distributor.

The preferred price is an average price calculated by dividing the total revenues earned from the sale of a particular software product sold to a particular client type (end user, retailer, wholesaler/distributor, or OEM) by the total number of these licenses sold to these clients within a specified period.

If an average price cannot be collected for packaged software, it is acceptable to collect an actual transaction price for the sale of an individual license to a particular client type as long as the software publisher does not negotiate separate prices for separate clients of the same type (i.e. all retailers are offered the same per unit price). If the software publisher offers volume discounting in which the price per license decreases as the quantity of licenses increases, the price reported each month should be the per license price for a specified quantity of licenses sold. If software publishers negotiate separate prices with different clients of the same type, an estimated transaction price should be collected. A recent transaction which is representative of

the establishment's business should be chosen. Each month during repricing, the respondent will estimate the per license price for the chosen transaction if a similar client were to purchase the same number of licenses.

### ***Renewed software maintenance prices***

Since the price of first year maintenance will always be collected with the price of enterprise license agreements, renewed maintenance agreements will be allowed a separate chance of selection. These transactions will be collected with an estimated transaction price.

Maintenance is charged as a fixed percentage of the initial license price. The price of renewed maintenance will always be tied to the price of the license at the time it was initially transacted. Over time, the price of renewed maintenance transactions should move in the same direction as the price of the firm's license sales for any given software product. This will be lagged, however, with the prices of recent renewed maintenance transactions based on the license prices for the products in the preceding years.

For these transactions, a typical, recently renewed maintenance transaction should be selected. The product configuration (i.e. number of client and server licenses) and the number of years since the initial license sale will be noted. During repricing, the respondent will estimate the price of renewed maintenance in the current month for the specified licensing configuration purchased a specified number of years ago. For example, if the selected transaction is for a renewed maintenance agreement for a license purchased 2 years ago, in July 2005 the respondent will estimate the price of renewed maintenance based on the license sale prices in July 2003. In August 2005, the respondent will estimate the price based on license sale prices in August 2003.

### ***Prices for other services related to software***

Other software related services, such as technical support, consulting, and training, will be collected with the price of the entire engagement, or the entire term of service for any given project. The price will typically be expressed as the sum of the dollar values for each billed hour of time that a software publisher's employees worked on the project. In future months, the respondent will provide an *estimated transaction price* of what would be charged if they were to offer the same type of service to a similar client. If the responding firm has specific service offerings that they provide repeatedly, such as regular training classes or standard technical support offerings for packaged software, then the respondent may provide an *actual transaction price* based on the most recent sale of the service offering.

## **3.5.2.2 Service/Pricing Characteristics**

### ***System software***

The Census Bureau classifies the following types of software as system software: operating systems software, network software, database management software, and development tools and programming languages software.

Operating systems software handles the interface to peripheral hardware, schedules tasks, allocates storage, and presents a default interface to the user when no application program is running. Network software controls, monitors, manages and communicates with operating systems, networks, network services, databases, storage and networked applications in an

integrated and cooperative fashion across a network from a central location. Database management software enables the storage, modification, and extraction of information from a database. Development tools and programming languages software assists in the development and/or authoring of computer programs and supports the professional developer in the design, development, and implementation of a variety of software systems and solutions.

### ***Desktop and portable device application software***

Desktop and portable device application software includes software that is often used for home or personal use and usually consists of a single license for use on a single computer, such as a PC, laptop, PDA, or other device. Examples of desktop and portable device application software include word processing software, spreadsheet software, personal finance software, and tax accounting software. This type of software may be purchased by both businesses and households.

### ***Other application software publishing, including utilities software and cross-industry and vertical market enterprise applications***

Utilities software runs tasks to maintain and monitor the computer system and its data files. Examples of utility software include virus checkers and screen savers. Cross-industry enterprise application software performs or manages a specific business function or process that is not unique to a particular industry. Examples include general administrative software such as HR software and accounting software. Vertical market enterprise application software performs a wide range of business functions for a specific industry group such as manufacturing, retail, healthcare, or engineering. Both of these latter types of enterprise software are typically server based.

### ***Game Software***

Game software is usually purchased by households. It includes software which runs on PCs as well as video game console platforms. Game software includes only the game cartridges or discs. The consoles or devices used to run the cartridges or discs are not classified in this industry.

### ***Technical support, training, and other services related to software publishing***

Software publishers provide other primary services to aid in the successful use of their software. These services include technical support, consulting, implementation, and training services. These services are considered primary to the industry only when software publishers offer these services for their own published software.

Software publishers also offer software product updates and maintenance agreements.

### ***Constant quality measurement issues***

Software publishers are constantly enhancing their software products with new features and functionality. We currently substitute by direct comparison when the differences between the current and new products are minimal. When there are large changes in functionality, such as the release of a new version, we attempt to approximate the value of the quality change by asking respondents to estimate the development costs associated with the enhancements made to the new version as well as the total number of licenses sold of the previous version. This

gives us a per-unit estimate of the production costs associated with the quality change in the software which we can use to make a price adjustment.

With the rapid technological change in this industry, it is necessary to periodically augment the sample in order to capture revolutionary products. This procedure allows for pricing a better overall mix of current software products, licensing models, and related services offered in the market place.

### **3.5.2.3 Sample Unit Identification and Frame and Sampling Issues**

For virtually all sample units, however, the sample unit will refer to the operations of the entire firm. However, in some cases, the sample unit may be the software publishing division of a larger firm that operates across multiple industries, such as computer systems design, and computer hardware manufacturing.

## **3.5.3 Television Broadcasting**

### **3.5.3.1 Output Measurement**

#### **Output definition**

The primary output of this industry is the provision of broadcast television signals to an audience, which can be measured through the sale of advertising time during which specified levels of audience are available. Secondary to the provision of broadcast television signals, most television stations, networks, and barter syndicators provide additional levels of support, whether it is production of the advertisement or verification services. These services may include verification that the advertising took place and what audience was delivered during the running of the advertisement.

#### **Pricing methodologies**

##### ***Television Stations***

The preferred price for television advertising sales is an average spot rate for a selected daypart. For example, if the daypart selected is prime time, then the average spot rate received by the local TV station for performing advertising services should be collected. This average should be calculated by dividing total revenue for selected daypart by total number of spots (local spots for local advertising and national spots for national advertising) sold for that daypart. This typically will be referred to as the station's base rate. This average can be calculated for any time period for which the respondent has data (day, week, month, etc.). An alternative method for determining the average rate uses the average cost per point or cost per thousand figures with the corresponding audience data. For example, if the average prime time CPP is \$300 and the station averages an 8 rating for prime time, then the average spot rate is \$2,400 ( $\$300 \times 8$ ).

For advertising, a fallback price is the *spot rate*, which is the actual rate received by the station for selling advertising services. In standard PPI pricing terms, this is an actual transaction rate. List prices are appropriate from stations that sell advertising services directly from a list, or rate sheet. These prices are also appropriate when average and actual prices cannot be obtained.

For network television affiliate services, the price is the annual contract amount, or “network compensation,” that local stations receive from networks for carrying the network’s programming.

### ***Networks and Syndicators***

The methodology for pricing network advertising is the same as described for local stations.

For programming contracts, syndication companies receive an annual fee. A specific contract is selected initially and the fees are updated when the contract is renewed.

### **3.5.3.2 Service/Pricing Characteristics**

#### ***Television Stations***

Television station advertising sales include the sale of advertising time to both local and national advertisers. Included in the time devoted for various types of programming that is broadcast by the local television stations is commercial advertising time. Local stations can sell this time in increments, known as spots, to both local and national advertisers. Local advertisers are establishments located within, or close to, the broadcast coverage area of the local station. An example of a local advertiser is an automobile dealership located in the same city as the station. National advertisers are establishments that in addition to conducting business within the coverage area of the station, have operations in other parts of the country as well. For example, automobile manufacturers such as Ford, General Motors, or Honda, are national advertisers.

In addition to revenue received from the sale of advertising time, local stations affiliated with a broadcast network agree to broadcast the network’s programming and commercials in their respective markets. In return for doing so, networks provide compensation and advertising time during its programming to the local stations. In addition, local stations are able to provide programming content to its viewers typically at a lower cost than by acquiring it on its own.

#### ***Networks and Syndicators***

Like local television stations, networks and national barter syndication companies sell advertising time during their programming to national advertisers. This differs from local TV station advertising because of the mass audience capabilities. Network programming and nationally syndicated programs are capable of reaching the entire television household universe. It is very important for national barter syndicators to clear their programming in as many markets as possible in order to be capable of reaching the largest possible audience. Clearing their programming refers to getting agreements from local TV stations to air the syndicated programming in their market.

### **Constant quality measurement issues**

A primary concern for television advertising is the inconsistency in the viewing audience over time. Seasonal changes in viewing habits and special programming tend to influence the amount of audience available to advertisers. By pricing average advertising rates, constant quality is maintained and no further adjustments are necessary.

### 3.5.3.3 Sample Unit Identification and Frame and Sampling Issues

The sample unit is an individual local station, network, or syndication company.

The frame used for this industry was the Cable and Television Factbook. This source provided a comprehensive list of local television stations with average weekly circulation as a size measure. Networks and syndicators were not available in this frame. Therefore, a frame was developed using Internet listings. The two frames were treated as separate strata.

## 3.5.4 Cellular and Other Wireless Telecommunications

### 3.5.4.1 Output Measurement

#### Output definition

The primary output of wireless telecommunication is that of placing parties in communication with each other by a radio tower network, which is networked by a wireline telephone network which is transparent to the end-user. The wireless telecommunication interface is characterized by relatively low-power omni-directional transmission between portable transmission devices and transmission towers. Cellular telephone services including traditional cellular service, Personal Communications Service (PCS), and Enhanced Specialized Mobile Radio (ESMR), are defined for this index as being “voice-grade” while speeds greater than 64kbps (kilobytes per second) are considered data. Some in the industry reserve the term “broadband,” which is also considered output of this industry, for speeds greater than 200kbps.

#### Pricing methodologies

The preferred price to collect for wireless telecommunications is fixed-weight average revenue for providing service to a specific market. Carriers are asked to provide average base period (billed) units of consumption, which will remain fixed during repricing, and average revenue per unit of consumption. The average revenue would be updated monthly, but would be calculated from current period units and revenues.

The price is obtained by computing the average price for each type of charge, multiplying the averages by their respective weights, and then summing the resultant revenues. This is *not* average revenue per line, which is revenue divided by the number of lines. This is revenue per average line, which is average prices multiplied by weighted (averaged) consumption. Also, note that revenue for some plan features, included in the final price, may be an average per line.

The following types of charges are included in the average revenue:

- *Access charge.* The basic charge is the *line charge* (the charge for a number) for cellular and other wireless customers. This is considered a monthly recurring charge.
- *Usage charges based on time.* Cellular usage, both inward (calls received) and outward (calls made), is metered and billed. Billing can be uniform (the first and last minute billed alike) or the initial period can be of a different duration or a different rate or both. At least one carrier charges for an initial period of one minute while additional periods are in increments of one second in duration. At least one carrier does not charge for the first incoming minute. Most carriers offer billing plans that contain an allowance, or “free”

minutes of airtime. There is usually an opposite but indirect relationship between the amount of free airtime and the recurring monthly charge. A high monthly charge guarantees a cash flow to the provider regardless of the vagaries of usage.

In addition to the standard usage charges, other charges, such as roaming minute charges, can be billed. These are charges for calls outside the providers' service area. They are much more expensive per minute, but otherwise they are treated the same as standard usage.

- *Usage charges other than timed.* Some charges are based on factors other than time. The most common are charges computed on a per-call basis. These charges are usually in addition to timed usage charges. Some roaming charges are rated on a per call basis and companies charge a fixed fee per day that roaming charges are incurred. For example, if your base area is Washington, D.C. and you place calls from Florida on one day, one would pay: 1) the day fee, 2) the roaming charge, and 3) the long distance telephone toll charges. A per-call charge might not be charged or could be charged in lieu of the roaming minute charge, or in addition to the roaming minute charge. Fee schedules are not uniform in structure or amounts.
- *Individual features and feature packages.* Cellular customers are much like wireline telephone customers in that new features, or options, are constantly being offered. Most features are offered on a per line basis although some could be billed on a per-account basis. These features include caller-ID, call waiting, and voice-mail. All these features are alike in the sense that they utilize the computerized switching equipment that provides the basic ability to control the network in the first place.
- *Non-recurring charges.* These are one-time charges like activation fees, cancellation fees, etc. Activation fees are routinely waived in promotion programs. The two major causes of plan cancellations are 1) switching from one plan to another within the same company (in which case fees are routinely waived) and 2) bankruptcy (in which case the fee is uncollectible). Basically, non-recurring fees are waived so often that they have no noticeable effect on total revenue.

Note that revenue for some plan features, included in the final price, may be an average per line.

If a company is unable to provide the average revenue, it is acceptable to price a bill for a standard service package.

#### **3.5.4.2 Service/Pricing Characteristics**

The types of wireless services included in this industry are defined as follows:

##### ***Cellular and other (Voice Grade) wireless services***

These services allow customers to converse or send data just like a wireline service. The distinction between the three types of voice-grade wireless services (cellular, PCS, and ESMR), is primarily broadcasting frequency and how they are licensed. To the buyer, the technical differences between the three are essentially transparent.

Multiple purchasing plans exist for each of these services, but these are billing arrangements not different services. Computer systems allow many options but the service is still “talking”.

### ***Broadband***

This service allows data and graphics to be sent interactively over a network. This is essentially wireless internet and functions at the 200+kbps range.

### ***Data (Instant Messaging)***

This service allows data and graphics to be sent interactively over a network. This is most efficiently done in the 65-200 kbps range to take full advantage of the digital network and protocols of the broadband wireless network.

### **Constant quality measurement issues**

There is a strong concern about new item bias in this industry. New services in this industry are expected to be introduced frequently and to become popular quickly. When completely new services are introduced there is concern about when to include them and how to adjust for their weight. The introduction of new products or service features after the index reference date is problematic for a Laspeyres index. However, if the index is not augmented to show these new services, new item bias will result. New service features are generally included as “other revenue” in the average price calculation and they are not discernible from the existing features.

#### **3.5.4.3 Sample Unit Identification and Frame and Sampling Issues**

The frame source is the Cellular Telecommunications Industry Association (CTIA) research department. This frame was segmented into three explicit strata that correspond to the FCC licensing classifications. The frame represents those establishments that have their own facilities and therefore provide an exhaustive list. Resellers are out of scope. “Plane phones” and “train phones” were truncated. Cellular and other wireless services are treated as separate establishments from other lines of business even when owned by the same company and located at the same address.

The traditional cellular strata consist of those MSA and RSA licenses awarded in the 1980’s auctions for cellular service. There are two bands for each license area. One band was awarded to long distance carriers and the second to other carriers generally but not exclusively to local phone companies. The PCS includes the winners of the 1990’s PCS license auctions. The basis for a PCS license is a much larger geographic area than for the first cellular licenses and there are six licenses instead of two for each area. In some cases, traditional and PCS license areas are subdivided with separate carriers in each subdivision. The ESMR strata consists of those companies originally providing “push-to-talk” service, but upgraded to a cellular-like service.

Within each stratum, the first step of disaggregation was geographic area. The sample was designed in this manner to minimize multiple selections in the same geographic areas while still sampling proportionate to size. In addition, items can be followed if the sampled license area is sold to another company.

These sampled license areas were then grouped according to the company that holds the license to form one sample unit. The number of quotes requested from each company corresponds to the number of geographic areas hit.

## **Government Regulations**

Licenses to provide cellular services were auctioned by the FCC during the 1980's and correspond to either a Metropolitan Statistical Area (MSA) or a Rural Statistical Area (RSA). Having public records of these licenses allowed the PPI to develop a sample frame that was exhaustive of all wireless companies operating in the US as well as to sample by geography.

### **3.5.5 ISPs and Web Search Portals**

#### **3.5.5.1 Output Measurement**

##### **Output definition**

The primary output of Internet service providers (ISP) is the provision of Internet access to a group of subscribers. These subscribers may be residential households, business or institutional facilities, or other Internet access providers. The unit of measure for this industry is an individual connection to the Internet.

The primary output of web search portals is the provision of a tool that allows an Internet user to locate particular sites that are of interest. This can be measured through the sale of listings and advertisements to companies who are interested in making an impression on the audience of Web searchers who visit the site.

It is difficult to ascertain whether certain product bundles reflect services that should be considered as primary to this industry. Some firms may offer services that bundle access services with other non-primary services, such as Web hosting.

##### **Pricing methodologies**

For Internet access services, the preferred price is an *average* price. This is the average of all rates that are charged to customers on a specific billing cycle for a specific form of access within a specific period of time. The average for each mode of access, such as dial-up, DSL, and leased line, will be collected as an average per line (the term "connection" may be used for dial-up and DSL). For leased line service, this average charge will be the average rate per line.

An individual *actual transaction price* was collected if average price data were not available. If this type of price is used, an individual transaction is selected for collection. However, for residential dial-up and DSL service, this will typically be the list price. This list price is acceptable for dial-up and DSL service only if the provider does not offer a significant amount of discounts.

For web search portals, the preferred price is an average of all rates that are charged to all customers for a specific form of advertising or listing service. These averages may be collected using click, impression, or paid inclusion as the unit of measure. Advertising formats include banners, classifieds, and pop-ups. Listings formats include directory, index, affiliate, and sponsored search.

An *estimated transaction price* was collected for web portal advertising and listings services if average price data were not available. This price should represent an estimate of what the seller would receive for a specific type of advertisement or listing if it were to be sold each month.

An individual actual transaction price was to be collected for distribution partner licensing services.

### **3.5.5.2 Service/Pricing Characteristics**

#### ***Internet service providers***

*Dial-up and DSL Internet access* is the provision of Internet access along the shared telephone network. With dial-up access, a modem at the end user's site converts an analog signal into a digital format that can be displayed on a computer screen. DSL technology provides a completely digital connection between the ISP and the user that allows Internet access to remain active at all times. ISDN lines also provide a digital connection, but are still considered a dial-up service because the connection does not remain active at all times.

*Leased line Internet access* is the provision of Internet access along a private telephone line reserved wholly or primarily for the use of an individual client. This service is provided to business and institutional users who require a large amount of Internet bandwidth capacity for their data processes. Examples of telecommunications lines that may be leased for Internet access include T-1, T-3, OC-3, and OC-12 lines.

*Other Internet access and related services* includes the provision of Internet access using any technologies other than dial-up, DSL, and leased lines. This includes wireless access, cable access, dark fiber Ethernet access, and satellite access. Also included in this group is advertising services offered by ISPs.

For Internet access, the most important price determining characteristics are the speed of the Internet connection and whether the access remains "always on". With dial-up access, a user must wait for a dial-up connection each time the Internet is being accessed. With DSL and leased line access, the connection remains "always on" and available at all times. The speed of the connection, measured in data transfer capacity or bandwidth, determines how much data, in the form of Web pages, Web applications, and data files, can be carried along the Internet to and from the end user's computer in a specific amount of time. Additional price determining characteristics for access services include the presence of bundled non-primary services such as Web hosting, e-mail, and instant messaging.

#### ***Web search portals***

*Web search portal listings services* refer to the sale of inclusions in the results of keyword generated searches on Web sites. The most common types of listings are sponsored search, directory, and index. These listings may be sold on a "price per click" or flat rate (inclusion) basis. A click is an instance in which an Internet user clicks upon a listing in order to proceed to the listed company's Web site. An inclusion is an individual Web page listing in a search result.

The most important price determining characteristics include the position of the purchased listing within the search results, and whether it includes a short written description of the listed

site. Another potentially important factor in the price of a listing is the amount of times that an Internet user clicks on it. Sometimes a buyer has to pay a set amount for each time their listing is clicked upon.

*Web search portal advertising services* include the sale of advertising on the portions of a Web search portal site not dedicated to listings results. The most frequent forms of advertisements include banner advertisements, pop-up advertisements, and classified advertisements. These advertisements may be sold on a “price per impression”, “price per click”, or flat rate basis. An impression is an instance in which an advertisement appears on the computer screen of an Internet user. A click is an instance in which an Internet user clicks upon an advertisement in order to proceed to the advertising company’s Web site.

The prices of advertising services are also sometimes determined by the number of times that they are clicked upon. The frequency of an advertisement’s appearance on a user’s computer screen can also be used to set the price. Generally, the size of the advertisement and its position on the computer screen will be key in determining its value and price. Also important are the size of the audience that visits the Web page on which the advertisement will run and the demographic makeup of that audience.

*Other Web search portal services* include Web search portal distribution partner licensing services. This refers to the sales of listings by a Web search portal to any other site for a cash fee. Frequently the other site will be another Web search portal. Any type of listings service can be sold in a distribution partner licensing contract.

### **Constant quality measurement issues**

In recent years, broadband Internet connections have grown in popularity as customers move away from the slower dial-up access to high speed connections like ADSL. This shift has become potential a source of new item bias. Directed substitution procedures will be implemented to determine if item substitution is necessary.

#### **3.5.5.3 Sample Unit Identification and Frame and Sampling Issues**

Many sample units are part of larger companies that are classified in other industries such as wired telecommunications or cable television. For these sample units, especially the backbone service providers, it was necessary to isolate the appropriate profit maximizing center (PMC) for the Internet access services and collect data provided by that PMC only. These larger companies did not appear in the frame since they were classified in other industries and had to be added.

Due to the high number of births and deaths in these industries, it was necessary to oversample these industries.

## 3.6 Professional Services

### 3.6.1 Output Measurement

#### Output definition

The primary output of this subsector is the provision of services by professionals with specialized knowledge and the experience necessary to apply this knowledge. These professionals include lawyers, accountants, engineers, and architects.

#### Pricing methodologies

Prices for professional services are modified model prices. Most of the services provided in these industries are based on unique, non-recurring transactions. Such industries require a specific contract to be collected and set as a baseline transaction. Inputs are fixed according to this baseline transaction. Although the sample unit may never encounter the exact transaction again, respondents report the amount of revenue they would hypothetically receive if the same contract were negotiated using the same inputs. The following example illustrates the use of this modified model methodology:

In the initial period, an accounting firm provides the following service description representing an actual service contract.

Type of service: Auditing. Time required for service completion: 290 hours. Client information: Repeat customer; commercial business. Length of billing period: Single bill for entire service. Services included in engagement:

| <i>Service rendered</i> | <i>Rate</i> | <i>Hours</i> | <i>Total fee</i> |
|-------------------------|-------------|--------------|------------------|
| Partner                 | \$375       | 10           | \$ 3,750         |
| Manager                 | \$300       | 40           | \$12,000         |
| Senior accountant       | \$220       | 60           | \$13,200         |
| Associates              | \$125       | 180          | \$22,500         |

*Total for services rendered: \$51,450*

During the next repricing period, the respondent is asked to price the exact same service as initially described.

There are several pricing alternatives across these industries. The most common methods include:

- *Contingency pricing* - A contingency fee is a payment that is made only if a specified outcome is achieved. For example, a contract in legal services may include a contingency clause that payment will be made for a favorable settlement in a personal injury case. These settlements are typically one-time occurrences that vary greatly in the amounts that they pay out and have no correlation to inputs such as number of hours worked.

- *Flat fees* – Professional may charge a single fee for service or project completion. Companies are asked estimate what the fee would be if the exact project were to be performed again.
- *Percentage of construction costs* - This pricing method applies to architectural services. Companies are asked to estimate what the construction costs and percentage fee for the selected project would be if the service were to be performed again.
- *Percentage of first-year compensation* – Executive search companies receive a percentage of the first-year salary for the position for which the executive is chosen. Companies are asked to estimate the salary and percentage fee for the selected position.

### **3.6.2 Service/Pricing Characteristics**

The output priced in the professional services is a transaction representing a bundle of services. The transaction price is obtained by selecting a contract or billing invoice. PPI collects detailed information about the contract (or invoice). These details may include labor descriptions, labor costs, labor hours, expenses, reimbursables, construction costs, multipliers, or other negotiated mechanisms for setting the price.

#### **Constant quality measurement issues**

Using model pricing for these industries allows the service delivery process, type of buyer, and contract terms to be held constant in most cases. Exceptions will occur when a service is no longer offered; a service is fundamentally altered due to government regulation; a service delivery process is modified; a service client change (loss of government contracts) or a service contract term(s) change.

When a service is discontinued, an attempt will be made to substitute a similar service and directly compare prices (i.e., one with similar primary inputs and input quantities). If a service is fundamentally altered or the service delivery process is modified, a direct comparison may not be possible. Therefore, the best option is to identify the changes in primary inputs (i.e., type of labor input, rates, and quantities) for the purpose of accessing whether the new input requirements and their costs enable an explicit quality adjustment.

However, certain technological improvements to inputs may enable the same exact service priced in a prior period to be produced more quickly (requires less labor-hours) in the current period thereby reducing costs that may lead to lower fees. In this case, input requirements have changed but the service provided has not, therefore the price reduction is valid and an explicit quality adjustment is unnecessary.

The outputs of the professional services industries may evolve due to introduction of new technologies or new types of services leading to potential new item bias. To address this bias, the researcher periodically contacts each reporter to review their sampled services and determine whether new types of services have been introduced. If new services are identified, probability techniques are employed to give these new services a chance of selection.

### **3.6.3 Sample Unit Identification and Frame and Sampling Issues**

The QCEW was used as the sample frame for the professional services. Depending on the industry, the sample unit is either the headquarters or an individual establishment.

## **3.7 Administrative Services**

### **3.7.1 Temporary Help Services**

#### **3.7.1.1 Output Measurement**

##### **Output definition**

A temporary help service is primarily engaged in supplying temporary help (employees) or continuing help to other businesses on a contract or fee basis. The help supplied is on the payroll of the supplying establishment but is under the direct or general supervision of the business to which the help is furnished. Many temporary help services offer their workers the same benefits that regular employees enjoy, such as dental and health insurance, 401(k) plans, paid holidays, and vacation pay. The average length of stay for a temporary worker is about 6 months, with very few staying for more than 2 years.

##### **Pricing methodologies**

The preferred price for temporary help services is the billing rate. This billing rate is the total amount the client company pays the temporary help service for the placement of temporary employees. This rate should not be confused with the pay rate – which is the rate a temporary help service pays the temporary employees. Collection of the billing rate is very convenient for reporters and helps ensure reporter compliance.

#### **3.7.1.2 Service/Pricing Characteristics**

The service that is priced is a specific job.

Prices for temporary help are billed on a per hour basis, and range depending on the skill of the employee, their assigned employment sector and client characteristics. Different employment sectors command different pay scales. If a temporary help agency has many locations, location would be a price determining characteristic. For example, a secretary in Los Angeles would command a very different wage than a secretary in rural Alabama.

##### **Constant quality measurement issues**

To maintain constant quality, the index disaggregates to a specific job instead of a specific contract, insuring that substitutes can be fairly easily acquired. When acquiring a substitute item, the price determining characteristics must be the same. For example, a substitute employee must have the same skills and work in the same assigned employment sector for a company with similar client characteristics.

Specifically, the job characteristics of each position that we hold constant include length of assignment, work shift, client characteristics, level of position, years of experience, and requirements such as education level, licensing and typing/computer skills. To insure that we

are also capturing discounts, a substitute employee should also come from a contract consisting of a similar number of employees and have the same risk evaluation.

There is no explicit quality adjustment when a matching substitute is found. Thus, any change in the billing rate for the new employee is reflected as a price change.

### **3.7.1.3 Sample Unit Identification and Frame and Sampling Issues**

The sample unit is the headquarters of the temporary help company. To be correctly classified in this industry, employees that are placed must be considered the employees of the sample unit. Otherwise, the company would be an employment placement agency.

The QCEW was used as the sample frame for this industry.

## **3.7.2 Employments Agencies**

### **3.7.2.1 Output Measurement**

#### **Output definition**

Employment agencies are essentially engaged in the business of connecting employers and potential employees in the labor market. Their business is the business of solving the economic problem of imperfect information. If employers had perfect knowledge about all individuals in the labor market and all prospective employees had perfect information about what jobs were currently being offered in the market, then there would be no establishments in this industry. Thus, establishments in this industry operate as “matchmakers,” agents that make connections between those offering employment and those seeking employment.

Contrasted with temporary help services, employees are compensated by the firm with which they are placed.

#### **Pricing methodologies**

The preferred price for employment agencies is the actual commission received for a single employee placement. This commission is a percentage of the expected first year earnings of the employee placed.

An estimated price is used if no transaction was completed in a particular month. There are no “list” prices in this industry, due to commission-based pricing.

### **3.7.2.2 Service/Pricing Characteristics**

There are two major factors that determine price in this industry: commission percentage, and the first-year compensation package of the position.

The commission rate is generally market-determined, and tends to prevail industry-wide.

The first-year compensation package is set by the client company, often with the agreement of the employment agency. Factors in determining the total compensation package generally relate to either describing the type of position being filled, or the type of employee being hired.

Some examples of these qualities include position title and seniority on the job end, and employee education, experience, and qualification on the employee end.

### **Constant quality measurement issues**

A good rule for determining whether a substituted service should be quality adjusted is to consider whether or not the new service represents a new form of business of the agency. For example, a retained search firm hiring a CEO of General Motors versus finding a new CEO for Lucent, is providing two very different services in one sense, but is really engaging in the same form of business. Thus, the disparate price changes would not be quality adjusted, as this is a price change that is really being felt by the company.

Explicit quality adjustment may be feasible in certain circumstances. For example, if a firm has to provide a training course for a certain candidate to fill a position, the cost of the training course could be quality-adjusted out.

On the other hand, a contingency payment recruiting firm that changes from filling mostly Operations, Administration, and Human Resources jobs to filling mostly Office and Clerical jobs, is changing their method of business. Therefore the subsequent price changes would be considered a “service substitution” and would be quality adjusted by a “link to show no change.” The above quality adjustment measures also apply to the e-commerce firms in this industry.

#### **3.7.2.3 Sample Unit Identification and Frame and Sampling Issues**

The sample unit is the headquarters of the placement agency.

The main frame source is Kennedy Info Inc.’s “Search Select” Electronic Database of their 1999 *Directory of Executive Recruiters*. Despite the title, the directory includes all employment agencies that receive commission payments.

The source of the e-commerce strata is a *Media Metrix* ranking of the Top 15 Electronic Recruiters by market share, two of which were excluded as being out-of-scope.

### **3.7.3 Janitorial Services**

#### **3.7.3.1 Output Measurement**

##### **Output definition**

The primary output is to furnish cleaning and maintenance services for buildings. Such cleaning services include janitorial services, maid/housekeeping, window cleaning, and chimney cleaning.

##### **Pricing methodologies**

The industry is dominated by contract pricing, although within each contract there is frequently some variation in the type of price. Establishments that provide janitorial/custodial services on a contract basis may charge a flat fee for their services. This flat fee is generally charged on a monthly basis and is sometimes billed on a per square foot basis. In addition, janitorial/custodial contractors may bill their clients on a cost plus markup basis. Establishments that bill in this type of manner compute all of their fixed and variable costs and then add a

percentage of sales/costs or a flat fee onto their total costs. The markup percentage may depend on the type of service performed, as there is no industry standard.

### **3.7.3.2 Service/Pricing Characteristics**

The primary services for this industry can be classified into a few major categories; descriptions of these primary services are outlined below:

**Janitorial/Custodial Services** – Includes daily cleaning services such as floor cleaning, vacuuming, floor stripping/scrubbing/buffing, venetian blind cleaning, bathroom cleaning, wastebasket/ash tray emptying, and dusting. Janitors and custodians work primarily in commercial or public buildings. Also included in this segment of the industry are institutional maid/housekeepers who provide many of the cleaning services that janitors and custodians provide in office buildings; however, these industry members generally work at hospitals, nursing homes, and hotels/motels where additional linen services are performed.

**Maid/Housekeeping Services** - Performed in a private home or other residential setting and may include other cleaning services such as stove cleaning, refrigerator cleaning, and other tasks that are considered time consuming and undesirable.

**Window Cleaning Services** – Includes window washing and cleaning services. There is some specialization of service within this component of the industry, since many janitorial companies also perform window cleaning services as ancillary services. This service line encompasses all window cleaning services, including commercial and residential building window cleaning as well as high-rise and single-story buildings. Window cleaning establishments may also perform awning cleaning or metal maintenance cleaning services, which are both considered part of this industry.

**Chimney Cleaning Services** - Includes services associated with cleaning chimneys. This service appears to be distinctive and unique in that only establishments specializing in chimney cleaning and repairs offer it. Providers of general maintenance and housekeeping services often do not include chimney sweeping among their services. Many chimney sweepers also provide chimney and flashing repair, chimney relining services, as well as masonry repair services, which are services classified in Masonry, Stone Setting, and Other Stone Work. In many situations, the chimney sweep may derive a plurality of revenues from the non-chimney sweep services and may be misclassified. The revenues from these non-primary services should be collected as an other receipt.

**Other Primary Services** - Includes telephone booth cleaning and service station cleaning and degreasing.

### **Constant quality measurement issues**

The characteristics of the service performed are held fixed allowing constant quality to be maintained over time.

### **3.7.3.3 Sample Unit Identification and Frame and Sampling Issues**

The sample unit is the headquarters location of companies providing janitorial services.

The QCEW was used as the sample frame for this industry.

## **3.8 Transportation Services**

### **3.8.1 Passenger Air Transportation**

#### **3.8.1.1 Output Measurement**

##### **Output definition**

The primary output provided by establishments in this industry is the transportation of passengers over regular routes and on regular schedules.

##### **Pricing methodologies**

The type of price for the majority of this industry is average revenue per passenger. When calculating this average, a number of different time periods (e.g. day, week, month) can be considered. It would be optimal to use an entire month of data. By using data for travel that occurs throughout the month, any and all travel events would be included. However, this presents a problem in that respondents would need a number of days after the end of the month to calculate the average and this would introduce a one-month lag to the index. Thus, using a 21-day time period for the current month was selected as an alternative. This allows ample time (on average 7 business days) for a participating airline to retrieve the data and submit it to be included for the current month's index. Using a 21-day period also serves to produce a lower volatility index (versus a day or week) that more accurately measures industry price trends.

Using this method allows the PPI to capture price trends from all levels of pricing (published and unpublished) and all distribution channels. Price changes due to a shift in the mix of distribution channels, web based fares or deep discount fares, infrequent fare sales, the substitution of fare codes over time, and zero fares (frequent flier mile tickets) can also be reflected in the index.

For those establishments unable to provide the average revenue per passenger data, a fallback pricing methodology of pricing fare codes can be used. If this methodology has to be used, disaggregation to an individual fare code is necessary. Suggested breakouts to get to an individual fare code are restricted versus unrestricted, round trip versus one-way, or nonstop travel versus direct or connecting travel. These are only suggestions, as the airline may have others.

#### **3.8.1.2 Service/Pricing Characteristics**

The primary service characteristics include:

- Region (domestic or international)
- Market (origin and destination)
- Cabin (first/business or coach)

The average revenue per passenger will be collected for a given O&D and will be for either coach or first class (including business) passengers. Each market will either be classified as domestic or international, depending on the O&D. So the region, market, and cabin class will be held constant. Controlling for these variables should ensure comparability of the data through time.

## **Constant quality measurement issues**

The development of the current pricing methodology grew out of increasing concerns that the PPI for airlines was exhibiting an upward bias. Some of the potential sources for this bias included the change in the mix of distribution channels, the transition to web based fares and/or deep discount fares, the substitution of fare codes over time, and the exclusion of zero fares (frequent flier mile tickets). By pricing individual fare codes, the PPI index had failed to capture these over time.

Over the last few years the airlines' mix of distribution channels has shifted and the Internet has become increasingly more prevalent, whether through an airline's direct Internet website or through one of the many web based distributors. Looking at Internet fares, it was found that these fares can disappear as quickly as they appear, making any kind of comparison using the current methodology almost impossible. In some cases these fares never reappeared. In addition, since data is collected directly from participating airlines using unique fare codes, it is believed that pricing via other traditional distribution channels (e.g. call centers, consolidators, brick and mortar travel agencies) where the fare codes and pricing may be different has never been captured correctly. Different fare codes are offered through different distribution channels. For example, in any given month a consumer may find the cheapest fare on an airline's website, on a third party internet website, or through a travel agent. Pricing individual fare codes not allow for an accurate comparison of this.

Another issue is the substitution of fare codes over time. In general, the PPI had gradually moved to what is referred to as "core" fare codes. Even though many of our current fare codes may indeed be considered "discount" fare codes they do not reflect fare sales or deep discounts. These "core" fares tend to be offered all the time and may or may not be actually purchased in a given month. Although these fares do represent part of an airline's pricing, they do not represent a very big portion of it. What the PPI ends up with is a group of fare codes that tend to move up in a slow and steady manner. The conclusion drawn from this is that pricing one fare code per O&D is not very reflective of the true price trends over time. The fact that a given airline may fly hundreds of routes and price discriminates in many ways on each of those routes is evidence that pricing one fare code per O&D does not accurately measure overall industry price trends.

### **3.8.1.3 Sample Unit Identification and Frame and Sampling Issues**

The frame used for sampling this industry was the UI file from 4<sup>th</sup> quarter 2004, augmented by using the BTS Air Carrier Financial Reports (Form 41 Financial Data). These were treated as two separate frames.

## **4 Where Does the PPI Go from Here?**

### **4.1 What Aggregation Strategies Should Be Considered to Include Services?**

#### **4.1.1 Industry and Commodity Strategies**

With the PPI currently producing numerous individual detailed service indices and its coverage of over 76% of in-scope output of this sector, a natural question arises as to what kinds of economically meaningful aggregations of service based indices can be produced? While the

focus of this section is on the research that is needed to develop a consensus on the publication of broad aggregates, such as a price index for the entire service sector, BLS is pleased to announce that planning is currently underway to begin calculation of additional aggregate indices for service subsectors and selected cross-sector aggregations. A companion paper describing these plans has been prepared for the June 9 FESAC meeting. The goal of adding selected aggregation detail to service industry PPIs is partly the result of the feedback received from the December 2005 FESAC meeting. For additional information, please see the paper, "Plans for New PPI Service Sector Aggregation Indexes" by Maureen Doherty and Roslyn Swick.

What are the various possible aggregations that could be developed to include the greatly expanded coverage of the service sector? One possible aggregation scheme for service industries would be to aggregate together all services. An industry index that nets out the flow of services between the services industries could be developed. A commodity based index based on the gross output of the service sector could also be produced.

In constructing aggregations of service industry indices, one distinction that is often drawn is the division between traditional service providing industries and distributive service industries – the latter including the NAICS sectors for Transportation, Wholesale Trade and Retail Trade. A second possibility would be to produce both net output and commodity indexes for traditional services, distributive services, and an index combining the two aggregates. Yet a third possibility, also consistent with some international practices, is to include transportation in traditional services and define distributive services as wholesale and retail trade.

A total industry index could also be produced that aggregates together services, distribution, manufacturing, agriculture and mining industry indices. This index would be an industry index that represents transactions in these industries which are going to final demand since all intermediate demand is netted out.

Weights for all these industries could be derived or obtained from the Economic Census data or Bureau of Economic Analysis data either in the form of Made-In-Industry weights, Wherever-Made weights or Input-Output data.

#### **4.1.2 Special Aggregate Indices**

A variety of special aggregations could be produced using data from all sectors of the economy that are priced in the PPI program.

A series of commodity and industry indices could be produced that are based on the gross fixed investment or the personal consumption expenditures data found in the BEA national accounts input output tables.

A special index could also be developed that measures business services. Most international definitions of business services include service sector industry output that is used for intermediate demand. Service and transportation indices are generally used for producing these indices. This index would generally be compiled from commodity data since commodity data are the international standard for PPIs as defined by the International Monetary Fund manual on Producer Price Indices.

Other possible aggregations may be used for specific groups of services. An index that combines various financial industry or commodity indices may be produced. For example, there

are currently two different PPI banking industries, both of which provide loans and deposit services. These two industries are Commercial Banks and Savings and Loans Institutions. From data in these two industries and any future financial industries that provide loans and/or deposit services, an index for all loans, all home loans, all auto loans, etc. may be developed that aggregates the various loan services together to produce a comprehensive set of indices on loans. The same type of aggregation could be done for deposit services.

Another special aggregation index could be developed for health services based on Major Diagnostic Categories (MDC) that would provide measurement of various treatments based on the MDCs. For example, indices from the hospitals, physicians, and pharmaceutical industries could be used to provide an index that measure the price of the various treatments based on MDCs. These series of indices are frequently requested and would be greatly utilized by both the medical community and the research community.

Another special aggregation would be to produce stage of processing indices that include services. The SOP indices would be produced using commodity indices, industry indices, or a combination of both.

#### **4.1.3 Future Developments**

If any of these aggregate indices were to be developed at the current time, they would have to be constructed from the lowest level industry indices, since current PPI systems allow an item to be used in only one lowest level index. However, over the next two years, the PPI program will have new computer and estimation system capabilities, which will allow items to be used in multiple lowest level indices thus permitting greater flexibility in the index construction techniques that can be employed. In addition, the PPI program has embarked on a research project to evaluate the viability of potential aggregation structures. Research areas may include determining the economic interpretation of the index, examining the index's relative volatility, and analyzing the usefulness of the index to data users. Once the research is completed and the new computer system is available, the PPI will be able to begin calculating new indexes based on our research results.

#### **4.2 What are the Gaps?**

Although the focus of this paper has been on the expansion of the PPI Program's coverage of the service-providing sector, there has been significant expansion of its coverage of non-residential construction. Indexes for four new building types are in various stages of planning, initial data collection, calculation and publication. New Warehousing and New Office Construction are in publication, New School Construction is being published in July 2006, and New Industrial and Manufacturing Buildings are being added in 2007. PPI is also planning on publishing, in 2008, indexes for four specialty building contractor trades to reflect work on new structures and maintenance of existing structures.

Despite these advances in coverage, significant gaps remain. The PPI program is beginning a comprehensive review of its coverage gaps and is attempting to determine methods for identifying and prioritizing the order of adding new industries into the family of indexes it produces. This section lists the gaps that exist and the next section provides an initial set of possible criteria for identifying this priority list.

This first list shows the NAICS industries that are simply out of scope for the PPI program. These industries do not have measurable marketed output and therefore, not eligible for inclusion in the PPI.

**Table 1**

---

| <b>2002 NAICS Code</b> | <b>Industry Title</b>                                                                           |
|------------------------|-------------------------------------------------------------------------------------------------|
| 488111                 | Air Traffic Control                                                                             |
| 519120                 | Libraries and Archives                                                                          |
| 519190                 | All Other Information Services                                                                  |
| 521110                 | Monetary Authorities - Central Bank                                                             |
| 541710                 | Research and Development in the Physical, Engineering, and Life Sciences                        |
| 541720                 | Research and Development in the Social Sciences and Humanities                                  |
| 561591                 | Convention and Visitors Bureaus                                                                 |
| 611110                 | Elementary and Secondary Schools                                                                |
| 611513                 | Apprenticeship Training                                                                         |
| 624110                 | Child and Youth Services                                                                        |
| 624120                 | Services for the Elderly and Persons with Disabilities                                          |
| 624190                 | Other Individual and Family Services                                                            |
| 624210                 | Community Food Services                                                                         |
| 624221                 | Temporary Shelters                                                                              |
| 624229                 | Other Community Housing Services                                                                |
| 624230                 | Emergency and Other Relief Services                                                             |
| 624310                 | Vocational Rehabilitation Services                                                              |
| 813110                 | Religious Organizations                                                                         |
| 813211                 | Grantmaking Foundations                                                                         |
| 813212                 | Voluntary Health Organizations                                                                  |
| 813219                 | Other Grantmaking and Giving Services                                                           |
| 813311                 | Human Rights Organizations                                                                      |
| 813312                 | Environment, Conservation and Wildlife Organizations                                            |
| 813319                 | Other Social Advocacy Organizations                                                             |
| 813410                 | Civic and Social Organizations                                                                  |
| 813910                 | Business Associations                                                                           |
| 813920                 | Professional Organizations                                                                      |
| 813930                 | Labor Unions and Similar Labor Organizations                                                    |
| 813940                 | Political Organizations                                                                         |
| 813990                 | Other Similar Organizations (except Business, Professional, Labor, and Political Organizations) |
| 814110                 | Private Households                                                                              |
| 525110                 | Pension Funds                                                                                   |
| 525120                 | Health and Welfare Funds                                                                        |
| 525190                 | Other Insurance Funds                                                                           |
| 525910                 | Open-End Investment Funds                                                                       |
| 525920                 | Trusts, Estates, and Agency Accounts                                                            |
| 525930                 | Real Estate Investment Trusts                                                                   |

---

---

| <b>2002 NAICS Code</b> | <b>Industry Title</b>                                                                    |
|------------------------|------------------------------------------------------------------------------------------|
| 525990                 | Other Financial Vehicles                                                                 |
| 551111                 | Offices of Bank Holding Companies                                                        |
| 551112                 | Offices of Other Holding Companies                                                       |
| 551114                 | Corporate, Subsidiary, and Regional Managing Offices                                     |
| 336414                 | Guided Missile and Space Vehicle Manufacturing                                           |
| 336415                 | Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing |
| 336419                 | Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing       |

---

Source: PPI Coverage and Expansion Team

This second list is a list of the industries that once had coverage in the PPI program but where no current coverage exists. There are a variety of reasons why there is no longer any PPI coverage of these industries. Some of these industries are dying industries in the US economy. Some of these NAICS industries were formerly covered SIC industries that, when mapped to newly created NAICS industries, resulted in insufficient coverage to produce an industry index in the PPI program.

**Table 2**

---

| <b>2002 NAICS Code</b> | <b>Industry Title</b>                                            | <b>Comments</b>                  |
|------------------------|------------------------------------------------------------------|----------------------------------|
| 212231                 | Lead ore and zinc mining                                         | Insufficient domestic production |
| 325221                 | Cellulosic organic fiber manufacturing                           | Insufficient domestic production |
| 331311                 | Alumina Refining (see note 1)                                    | Insufficient domestic production |
| 336992                 | Military Armored Vehicle, Tank, and Tank Component Manufacturing | Other                            |
| 337129                 | Wood Television, Radio, and Sewing Machine Cabinet Manufacturing | Insufficient domestic production |
| 441120                 | Used Car Dealers                                                 | NAICS change                     |
| 444210                 | Outdoor Power Equipment Stores                                   | NAICS change                     |
| 445120                 | Convenience Stores                                               | NAICS change                     |
| 446120                 | Cosmetics, Beauty Supplies, and Perfume Stores                   | NAICS change                     |
| 453910                 | Pet and Pet Supplies Stores                                      | NAICS change                     |
| 453920                 | Art Dealers                                                      | NAICS change                     |
| 522190                 | Other Depository Intermediation                                  | NAICS change                     |
| 522210                 | Credit Card Issuing                                              | NAICS change                     |
| 524291                 | Claims Adjusting                                                 | NAICS change                     |
| 524292                 | Third Party Administration of Insurance and Pension Funds        | NAICS change                     |

---

Source: PPI Coverage and Expansion Team

This third list is a list of industries that are in scope in the PPI and where the PPI program currently does not have coverage. This list includes the industries listed in Table 2.

**Table 3**

| <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                     | <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                            |
|--------------------------------|-----------------------------------------------------------|--------------------------------|------------------------------------------------------------------|
| 111411                         | Mushroom production                                       | 237310                         | Highway, street, and bridge construction                         |
| 111419                         | Other food crops grown under cover                        | 237990                         | Other heavy construction                                         |
| 111421                         | Nursery and tree production                               | 238111                         | Residential poured foundation contractors                        |
| 111422                         | Floriculture production                                   | 238121                         | Residential structural steel contractors                         |
| 111930                         | Sugarcane farming                                         | 238122                         | Nonresidential structural steel contractors                      |
| 111991                         | Sugar beet farming                                        | 238131                         | Residential framing contractors                                  |
| 112340                         | Poultry hatcheries                                        | 238132                         | Nonresidential framing contractors                               |
| 112420                         | Goat farming                                              | 238141                         | Residential masonry contractors                                  |
| 112511                         | Finfish farming and fish hatcheries                       | 238142                         | Nonresidential masonry contractors                               |
| 112512                         | Shellfish farming                                         | 238151                         | Residential glass and glazing contractors                        |
| 112519                         | Other animal aquaculture                                  | 238152                         | Nonresidential glass and glazing contractors                     |
| 112910                         | Apiculture                                                | 238161                         | Residential roofing contractors                                  |
| 112920                         | Horses and other equine production                        | 238171                         | Residential siding contractors                                   |
| 112930                         | Fur-bearing animal and rabbit production                  | 238172                         | Nonresidential siding contractors                                |
| 112990                         | All other animal production                               | 238191                         | Other residential exterior contractors                           |
| 113110                         | Timber tract operations                                   | 238192                         | Other nonresidential exterior contractors                        |
| 113210                         | Forest nursery and gathering forest products              | 238211                         | Residential electrical contractors                               |
| 114119                         | Other marine fishing                                      | 238221                         | Residential plumbing and HVAC contractors                        |
| 114210                         | Hunting and trapping                                      | 238291                         | Other residential equipment contractors                          |
| 115111                         | Cotton ginning                                            | 238292                         | Other nonresidential equipment contractors                       |
| 115112                         | Soil preparation, planting, and cultivating               | 238311                         | Residential drywall contractors                                  |
| 115113                         | Crop harvesting, primarily by machine                     | 238312                         | Nonresidential drywall contractors                               |
| 115114                         | Other postharvest crop activities                         | 238321                         | Residential painting contractors                                 |
| 115115                         | Farm labor contractors and crew leaders                   | 238322                         | Nonresidential painting contractors                              |
| 115116                         | Farm management services                                  | 238331                         | Residential flooring contractors                                 |
| 115210                         | Support activities for animal production                  | 238332                         | Nonresidential flooring contractors                              |
| 115310                         | Support activities for forestry                           | 238341                         | Residential tile and terrazzo contractors                        |
| 212231                         | Lead ore and zinc ore mining                              | 238342                         | Nonresidential tile and terrazzo contractors                     |
| 221310                         | Water supply and irrigation systems                       | 238351                         | Residential finish carpentry contractors                         |
| 221320                         | Sewage treatment facilities                               | 238352                         | Nonresidential finish carpentry contractors                      |
| 221330                         | Steam and air-conditioning supply                         | 238391                         | Other residential finishing contractors                          |
| 236115                         | New single-family general contractors                     | 238392                         | Other nonresidential finishing contractors                       |
| 236116                         | New multifamily general contractors                       | 238911                         | Residential site preparation contractors                         |
| 236117                         | New housing operative builders                            | 238912                         | Nonresidential site preparation contractors                      |
| 236118                         | Residential remodelers                                    | 238991                         | All other residential trade contractors                          |
| 236210                         | Industrial building construction (see nonresidential tab) | 238992                         | All other nonresidential trade contractors                       |
| 236220                         | Commercial building construction (see nonresidential tab) | 325221                         | Cellulosic organic fiber manufacturing                           |
| 237110                         | Water and sewer system construction                       | 326212                         | Tire retreading                                                  |
| 237120                         | Oil and gas pipeline construction                         | 331311                         | Alumina Refining                                                 |
| 237130                         | Power and communication system construction               | 334611                         | Software Reproducing                                             |
| 237210                         | Land subdivision                                          | 336992                         | Military Armored Vehicle, Tank, and Tank Component Manufacturing |

| <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                            | <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                              |
|--------------------------------|------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------|
| 337129                         | Wood Television, Radio, and Sewing Machine Cabinet Manufacturing | 487110                         | Scenic and Sightseeing Transportation, Land                        |
| 339116                         | Dental Laboratories                                              | 487210                         | Scenic and Sightseeing Transportation, Water                       |
| 425110                         | Business to Business Electronic Markets                          | 487990                         | Scenic and Sightseeing Transportation, Other                       |
| 441120                         | Used Car Dealers                                                 | 488210                         | Support Activities for Rail Transportation                         |
| 441221                         | Motorcycle Dealers                                               | 488390                         | Other Support Activities for Water Transportation                  |
| 441229                         | All Other Motor Vehicle Dealers                                  | 488410                         | Motor Vehicle Towing                                               |
| 442291                         | Window Treatment Stores                                          | 488490                         | Other Support Activities for Road Transportation                   |
| 442299                         | All Other Home Furnishings Stores                                | 488991                         | Packing and Crating                                                |
| 444210                         | Outdoor Power Equipment Stores                                   | 488999                         | All Other Support Activities for Transportation                    |
| 445120                         | Convenience Stores                                               | 493190                         | Other Warehousing and Storage                                      |
| 446120                         | Cosmetics, Beauty Supplies, and Perfume Stores                   | 512110                         | Motion Picture and Video Production                                |
| 446199                         | All Other Health and Personal Care Stores                        | 512120                         | Motion Picture and Video Distribution                              |
| 448130                         | Children's and Infants' Clothing Stores                          | 512131                         | Motion Picture Theaters (except Drive-Ins)                         |
| 448150                         | Clothing Accessories Stores                                      | 512132                         | Drive-In Motion Picture Theaters                                   |
| 448190                         | Other Clothing Stores                                            | 512191                         | Teleproduction and Other Postproduction Services                   |
| 451140                         | Musical Instrument and Supplies Stores                           | 512199                         | Other Motion Picture and Video Industries                          |
| 451212                         | News Dealers and Newsstands                                      | 512210                         | Record Production                                                  |
| 453310                         | Used Merchandise Stores                                          | 512220                         | Integrated Record Production/Distribution                          |
| 453910                         | Pet and Pet Supplies Stores                                      | 512230                         | Music Publishers                                                   |
| 453920                         | Art Dealers                                                      | 512240                         | Sound Recording Studios                                            |
| 453991                         | Tobacco Stores                                                   | 512290                         | Other Sound Recording Industries                                   |
| 453998                         | All Other Miscellaneous Store Retailers (except Tobacco Stores)  | 516110                         | Internet Publishing and Broadcasting                               |
| 454390                         | Other Direct Selling Establishments                              | 517310                         | Telecommunications Resellers                                       |
| 481219                         | Other Nonscheduled Air Transportation                            | 517410                         | Satellite Telecommunications                                       |
| 482112                         | Short Line Railroads                                             | 517910                         | Other Telecommunications                                           |
| 483112                         | Deep Sea Passenger Transportation                                | 519110                         | News Syndicates                                                    |
| 483114                         | Coastal and Great Lakes Passenger Transportation                 | 522130                         | Credit Unions                                                      |
| 483212                         | Inland Water Passenger Transportation                            | 522190                         | Other Depository Credit Intermediation                             |
| 485111                         | Mixed Mode Transit Systems                                       | 522210                         | Credit Card Issuing                                                |
| 485112                         | Commuter Rail Systems                                            | 522220                         | Sales Financing                                                    |
| 485113                         | Bus and Other Motor Vehicle Transit Systems                      | 522291                         | Consumer Lending                                                   |
| 485119                         | Other Urban Transit Systems                                      | 523991                         | Trust, Fiduciary, and Custody Activities                           |
| 485210                         | Interurban and Rural Bus Transportation                          | 523999                         | Miscellaneous Financial Investment Activities                      |
| 485310                         | Taxi Service                                                     | 524127                         | Direct Title Insurance Carriers                                    |
| 485320                         | Limousine Service                                                | 524128                         | Other Direct Insurance (except Life, Health, and Medical) Carriers |
| 485410                         | School and Employee Bus Transportation                           | 524130                         | Reinsurance Carriers                                               |
| 485510                         | Charter Bus Industry                                             | 524291                         | Claims Adjusting                                                   |
| 485991                         | Special Needs Transportation                                     | 524292                         | Third Party Administration of Insurance and Pension Funds          |
| 485999                         | All Other Transit and Ground Passenger Transportation            | 524298                         | All Other Insurance Related Activities                             |
| 486210                         | Pipeline Transportation of Natural Gas                           | 531110                         | Lessors of Residential Buildings and Dwellings                     |
| 486990                         | All Other Pipeline Transportation                                | 531190                         | Lessors of Other Real Estate Property                              |

| <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                                       | <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                      |
|--------------------------------|-----------------------------------------------------------------------------|--------------------------------|------------------------------------------------------------|
| 531390                         | Other Activities Related to Real Estate                                     | 541890                         | Other Services Related to Advertising                      |
| 532112                         | Passenger Car Leasing                                                       | 541910                         | Marketing Research and Public Opinion Polling              |
| 532210                         | Consumer Electronics and Appliances Rental                                  | 541921                         | Photography Studios, Portrait                              |
| 532220                         | Formal Wear and Costume Rental                                              | 541922                         | Commercial Photography                                     |
| 532230                         | Video Tape and Disc Rental                                                  | 541930                         | Translation and Interpretation Services                    |
| 532291                         | Home Health Equipment Rental                                                | 541940                         | Veterinary Services                                        |
| 532292                         | Recreational Goods Rental                                                   | 541990                         | All Other Professional, Scientific, and Technical Services |
| 532299                         | All Other Consumer Goods Rental                                             | 561110                         | Office Administrative Services                             |
| 532310                         | General Rental Centers                                                      | 561210                         | Facilities Support Services                                |
| 532411                         | Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing | 561410                         | Document Preparation Services                              |
| 532420                         | Office Machinery and Equipment Rental and Leasing                           | 561421                         | Telephone Answering Services                               |
| 532490                         | Other Commercial and Industrial Machinery and Equipment Rental and Leasing  | 561422                         | Telemarketing Bureaus                                      |
| 533110                         | Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)        | 561431                         | Private Mail Centers                                       |
| 541191                         | Title Abstract and Settlement Offices                                       | 561439                         | Other Business Service Centers (including Copy Shops)      |
| 541199                         | All Other Legal Services                                                    | 561440                         | Collection Agencies                                        |
| 541213                         | Tax Preparation Services                                                    | 561450                         | Credit Bureaus                                             |
| 541214                         | Payroll Services                                                            | 561491                         | Repossession Services                                      |
| 541320                         | Landscape Architectural Services                                            | 561492                         | Court Reporting and Stenotype Services                     |
| 541340                         | Drafting Services                                                           | 561499                         | All Other Business Support Services                        |
| 541350                         | Building Inspection Services                                                | 561520                         | Tour Operators                                             |
| 541360                         | Geophysical Surveying and Mapping Services                                  | 561599                         | All Other Travel Arrangement and Reservation Services      |
| 541370                         | Surveying and Mapping (except Geophysical) Services                         | 561611                         | Investigation Services                                     |
| 541380                         | Testing Laboratories                                                        | 561613                         | Armored Car Services                                       |
| 541410                         | Interior Design Services                                                    | 561621                         | Security Systems Services (except Locksmiths)              |
| 541420                         | Industrial Design Services                                                  | 561622                         | Locksmiths                                                 |
| 541430                         | Graphic Design Services                                                     | 561710                         | Exterminating and Pest Control Services                    |
| 541490                         | Other Specialized Design Services                                           | 561730                         | Landscaping Services                                       |
| 541511                         | Custom Computer Programming Services                                        | 561740                         | Carpet and Upholstery Cleaning Services                    |
| 541512                         | Computer Systems Design Services                                            | 561790                         | Other Services to Buildings and Dwellings                  |
| 541513                         | Computer Facilities Management Services                                     | 561910                         | Packaging and Labeling Services                            |
| 541519                         | Other Computer Related Services                                             | 561920                         | Convention and Trade Show Organizers                       |
| 541620                         | Environmental Consulting Services                                           | 561990                         | All Other Support Services                                 |
| 541690                         | Other Scientific and Technical Consulting Services                          | 562112                         | Hazardous Waste Collection                                 |
| 541820                         | Public Relations Agencies                                                   | 562119                         | Other Waste Collection                                     |
| 541830                         | Media Buying Agencies                                                       | 562211                         | Hazardous Waste Treatment and Disposal                     |
| 541840                         | Media Representatives                                                       | 562212                         | Solid Waste Landfill                                       |
| 541850                         | Display Advertising                                                         | 562213                         | Solid Waste Combustors and Incinerators                    |
| 541860                         | Direct Mail Advertising                                                     | 562219                         | Other Nonhazardous Waste Treatment and Disposal            |
| 541870                         | Advertising Material Distribution Services                                  | 562910                         | Remediation Services                                       |

| <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                                     | <b>2002<br/>NAICS<br/>Code</b> | <b>Industry Title</b>                                                             |
|--------------------------------|---------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------------------------------------|
| 562920                         | Materials Recovery Facilities                                             | 711110                         | Theater Companies and Dinner Theaters                                             |
| 562991                         | Septic Tank and Related Services                                          | 711120                         | Dance Companies                                                                   |
| 562998                         | All Other Miscellaneous Waste Management Services                         | 711130                         | Musical Groups and Artists                                                        |
| 611210                         | Junior Colleges                                                           | 711190                         | Other Performing Arts Companies                                                   |
| 611310                         | Colleges, Universities, and Professional Schools                          | 711211                         | Sports Teams and Clubs                                                            |
| 611410                         | Business and Secretarial Schools                                          | 711212                         | Racetracks                                                                        |
| 611430                         | Professional and Management Development Training                          | 711219                         | Other Spectator Sports                                                            |
| 611511                         | Cosmetology and Barber Schools                                            | 711310                         | Promoters of Performing Arts, Sports, and Similar Events with Facilities          |
| 611512                         | Flight Training                                                           | 711320                         | Promoters of Performing Arts, Sports, and Similar Events without Facilities       |
| 611519                         | Other Technical and Trade Schools                                         | 711410                         | Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures |
| 611610                         | Fine Arts Schools                                                         | 711510                         | Independent Artists, Writers, and Performers                                      |
| 611620                         | Sports and Recreation Instruction                                         | 712110                         | Museums                                                                           |
| 611630                         | Language Schools                                                          | 712120                         | Historical Sites                                                                  |
| 611691                         | Exam Preparation and Tutoring                                             | 712130                         | Zoos and Botanical Gardens                                                        |
| 611692                         | Automobile Driving Schools                                                | 712190                         | Nature Parks and Other Similar Institutions                                       |
| 611699                         | All Other Miscellaneous Schools and Instruction                           | 713120                         | Amusement Arcades                                                                 |
| 611710                         | Educational Support Services                                              | 713210                         | Casinos (except Casino Hotels)                                                    |
| 621112                         | Offices of Physicians, Mental Health Specialists                          | 713290                         | Other Gambling Industries                                                         |
| 621210                         | Offices of Dentists                                                       | 713920                         | Skiing Facilities                                                                 |
| 621310                         | Offices of Chiropractors                                                  | 713930                         | Marinas                                                                           |
| 621320                         | Offices of Optometrists                                                   | 713950                         | Bowling Centers                                                                   |
| 621330                         | Offices of Mental Health Practitioners (except Physicians)                | 713990                         | All Other Amusement and Recreation Industries                                     |
| 621340                         | Offices of Physical, Occupational and Speech Therapists, and Audiologists | 721191                         | Bed-and-Breakfast Inns                                                            |
| 621391                         | Offices of Podiatrists                                                    | 721199                         | All Other Traveler Accommodation                                                  |
| 621399                         | Offices of All Other Miscellaneous Health Practitioners                   | 721211                         | RV (Recreational Vehicle) Parks and Campgrounds                                   |
| 621410                         | Family Planning Centers                                                   | 721214                         | Recreational and Vacation Camps (except Campgrounds)                              |
| 621420                         | Outpatient Mental Health and Substance Abuse Centers                      | 721310                         | Rooming and Boarding Houses                                                       |
| 621491                         | HMO Medical Centers                                                       | 722110                         | Full-Service Restaurants                                                          |
| 621492                         | Kidney Dialysis Centers                                                   | 722211                         | Limited-Service Restaurants                                                       |
| 621493                         | Freestanding Ambulatory Surgical and Emergency Centers                    | 722212                         | Cafeterias                                                                        |
| 621498                         | All Other Outpatient Care Centers                                         | 722213                         | Snack and Nonalcoholic Beverage Bars                                              |
| 621910                         | Ambulance Services                                                        | 722310                         | Food Service Contractors                                                          |
| 621999                         | All Other Miscellaneous Ambulatory Health Care Services                   | 722320                         | Caterers                                                                          |
| 623220                         | Residential Mental Health and Substance Abuse Facilities                  | 722330                         | Mobile Food Services                                                              |
| 623311                         | Continuing Care Retirement Communities                                    | 722410                         | Drinking Places (Alcoholic Beverages)                                             |
| 623312                         | Homes for the Elderly                                                     | 811111                         | General Automotive Repair                                                         |
| 623990                         | Other Residential Care Facilities                                         | 811112                         | Automotive Exhaust System Repair                                                  |
| 624410                         | Child Day Care Services                                                   | 811113                         | Automotive Transmission Repair                                                    |

---

| 2002<br>NAICS<br>Code | Industry Title                                                    | 2002<br>NAICS<br>Code | Industry Title                                          |
|-----------------------|-------------------------------------------------------------------|-----------------------|---------------------------------------------------------|
| 811118                | Other Automotive Mechanical and Electrical Repair and Maintenance | 812112                | Beauty Salons                                           |
| 811121                | Automotive Body, Paint, and Interior Repair and Maintenance       | 812113                | Nail Salons                                             |
| 811122                | Automotive Glass Replacement Shops                                | 812191                | Diet and Weight Reducing Centers                        |
| 811191                | Automotive Oil Change and Lubrication Shops                       | 812199                | Other Personal Care Services                            |
| 811192                | Car Washes                                                        | 812210                | Funeral Homes and Funeral Services                      |
| 811198                | All Other Automotive Repair and Maintenance                       | 812220                | Cemeteries and Crematories                              |
| 811211                | Consumer Electronics Repair and Maintenance                       | 812310                | Coin-Operated Laundries and Drycleaners                 |
| 811212                | Computer and Office Machine Repair and Maintenance                | 812320                | Drycleaning and Laundry Services (except Coin-Operated) |
| 811213                | Communication Equipment Repair and Maintenance                    | 812331                | Linen Supply                                            |
| 811219                | Other Electronic and Precision Equipment Repair and Maintenance   | 812332                | Industrial Launderers                                   |
| 811411                | Home and Garden Equipment Repair and Maintenance                  | 812910                | Pet Care (except Veterinary) Services                   |
| 811412                | Appliance Repair and Maintenance                                  | 812921                | Photofinishing Laboratories (except One-Hour)           |
| 811420                | Reupholstery and Furniture Repair                                 | 812922                | One-Hour Photofinishing                                 |
| 811430                | Footwear and Leather Goods Repair                                 | 812930                | Parking Lots and Garages                                |
| 811490                | Other Personal and Household Goods Repair and Maintenance         | 812990                | All Other Personal Services                             |
| 812111                | Barber Shops                                                      |                       |                                                         |

---

Source: PPI Coverage and Expansion Team

### 4.3 What Principles Should Be Used to Determine where PPI Should Be Expanded?

Decisions are continually being made in the PPI program as to where resources are best placed in the program. As described above, critical resources are being used to develop the much needed new computer system for producing the PPI. In the future, it is hoped that existing or possibly additional resources can be used to provide additional detailed indices in the existing PPI industry and commodity indices and/or to expand into areas where there currently are no PPI industry or commodity indices.

By researching where the PPI should expand or add index coverage, the PPI program is hoping to develop a systematic methodology for analyzing where the additional data should be added. The following is a list of possible criteria that could be used to determine where the additional resources should be utilized.

1. Should the value of shipments or turnover for an industry or a product area be the primary basis for deciding the importance of producing indices for a particular industry or for providing more detailed indices for a particular industry?

If value of shipments data based on 2002 Economic Census would be used to select the industries for PPI to expand, the following 25 non-covered industries have the highest values:

| 2002 NAICS Code | Industry Title                                 | 2002 VOS (\$000) |
|-----------------|------------------------------------------------|------------------|
| 722110          | Full-Service Restaurants                       | 144,649,964      |
| 236220          | Commercial building construction               | 139,929,312      |
| 236117          | New housing operative builders                 | 139,021,424      |
| 238221          | Residential plumbing and HVAC contractors      | 117,785,785      |
| 722211          | Limited-Service Restaurants                    | 116,516,316      |
| 522220          | Sales Financing                                | 115,236,407      |
| 522294          | Secondary Market Financing                     | 102,426,532      |
| 238211          | Residential electrical contractors             | 82,141,261       |
| 237310          | Highway, street, and bridge construction       | 81,660,219       |
| 541512          | Computer Systems Design Services               | 78,335,457       |
| 522292          | Real Estate Credit                             | 75,479,073       |
| 621210          | Offices of Dentists                            | 71,102,922       |
| 236115          | New single-family general contractors          | 61,781,469       |
| 541511          | Custom Computer Programming Services           | 60,125,952       |
| 531110          | Lessors of Residential Buildings and Dwellings | 55,295,976       |
| 512110          | Motion Picture and Video Production            | 46,761,808       |
| 236118          | Residential remodelers                         | 45,034,336       |
| 238912          | Nonresidential site preparation contractors    | 37,442,354       |
| 238911          | Residential site preparation contractors       | 37,442,354       |
| 522130          | Credit Unions                                  | 37,050,065       |
| 522210          | Credit Card Issuing                            | 35,855,753       |
| 561730          | Landscaping Services                           | 35,171,624       |
| 522298          | All Other Nondepository Credit Intermediation  | 34,918,178       |
| 237130          | Power and communication system construction    | 34,810,458       |
| 524130          | Reinsurance Carriers                           | 34,182,779       |

- Is the completion of a subsector a basis for determining if an industry index should be produced? Many times industries in the same subsector have similar products or services, so an already developed and vetted pricing methodology may already exist and can be used to produce indices for these industries. In addition, there may be substantial overlap between existing industries and new industries. By completing the subsector, better or more comprehensive commodity indices may be able to be developed. Some subsectors have PPI industry indices but these indices do not have sufficient weight so the PPI program cannot publish an aggregate index for these subsectors. For example, there may be industries A and B for which PPI has industry indices but no indices for industries C, D, and E. These three industries with no indices may make up 50% of the subsector with industry C accounting for 30% of the total weight. If an index is produced for industry C, then the subsector would have 80% coverage and an aggregate could then be produced for this subsector with no additional resources required. Would this be a sufficient reason to attempt to price industry C? An alternative strategy may be to develop PPI industry indices for subsectors where there is little or no coverage of the subsector. The advantage to producing industry indices in a subsector with little or no price indices would be two-fold. There would be additional information for any subsector that previously had no indices since there would now be indices. In addition, if the PPI program was producing aggregate indices for the entire US marketed economy or intermediate demand indices or any other stage of processing type indices, there would data to estimate other industry or commodity indices for the missing industries in that sector.

There are three industries that were moved from services and retail trade to manufacturing in the NAICS. These industries would complete the in-scope manufacturing sector. These industries are:

| 2002 NAICS Code | Industry Title       |
|-----------------|----------------------|
| 339116          | Dental Laboratories  |
| 334611          | Software Reproducing |
| 326212          | Tire retreading      |

Currently, four industries, which represent 88% of NAICS subsector 523, Securities, commodity contracts, and other financial investments and related activities, have price indices in the PPI. In order to complete the coverage of this subsector, the following industries would be added to those four industries:

| 2002 NAICS Code | Industry Title                                |
|-----------------|-----------------------------------------------|
| 523130          | Commodity Contracts Dealing                   |
| 523140          | Commodity Contracts Brokerage                 |
| 523210          | Securities and Commodity Exchanges            |
| 523910          | Miscellaneous Intermediation                  |
| 523991          | Trust, Fiduciary, and Custody Activities      |
| 523999          | Miscellaneous Financial Investment Activities |

There are several subsectors in the PPI that have no coverage. Subsectors 711, Performing arts, spectator sports, and related industries and 712, Museums, historical sites and similar institutions, are two these subsectors with no current price indices. If these subsectors were to be priced in the PPI, the following industries would be added:

| 2002 NAICS Code | Industry Title                                                                    |
|-----------------|-----------------------------------------------------------------------------------|
| 711110          | Theater Companies and Dinner Theaters                                             |
| 711120          | Dance Companies                                                                   |
| 711130          | Musical Groups and Artists                                                        |
| 711190          | Other Performing Arts Companies                                                   |
| 711211          | Sports Teams and Clubs                                                            |
| 711212          | Racetracks                                                                        |
| 711219          | Other Spectator Sports                                                            |
| 711310          | Promoters of Performing Arts, Sports, and Similar Events with Facilities          |
| 711320          | Promoters of Performing Arts, Sports, and Similar Events without Facilities       |
| 711410          | Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures |
| 711510          | Independent Artists, Writers, and Performers                                      |
| 712110          | Museums                                                                           |
| 712120          | Historical Sites                                                                  |
| 712130          | Zoos and Botanical Gardens                                                        |
| 712190          | Nature Parks and Other Similar Institutions                                       |

- Should user demand for specific industries or specific detailed indices be a determining factor when deciding where to expand the PPI? Should the PPI program be surveying trade associations and other data users to determine areas where more indices are required? If so, what data users should be surveyed? What do other Federal agencies such as BEA, Census and the Federal Reserve Board think are the most significant gaps to be filled in the future and in what priority?

The PPI has begun an initial dialog with its counterparts in the BEA Current Industry Analysis Division. Based on this dialog, additional PPI data would be needed in the following industries:

**BEA Current Industry Analysis Division (CIAD) Priorities for BLS PPIs**  
May 8, 2006

CIAD maintains and develops BEA's Annual Industry Accounts (AIAs), which consist of the annual time series of input-output (IO) and GDP-by-industry tables. The commodity composition of each industry's domestically-produced output and its inputs (including imported inputs) are derived at roughly the 6-digit NAICS level-of-detail within a balanced IO framework. Next, each industry's contribution to real GDP growth is derived by deflating its outputs and inputs, primarily with BLS producer and international price indexes. BEA publishes quantity and price measures of industry output, input, and value added at roughly the 3-digit NAICS level-of-detail for all private industries and government.

CIAD uses approximately 1,900 PPI's and 270 IPI's to deflate industries outputs and inputs, nonetheless, several gaps in PPI coverage exist which, if addressed, would significantly improve the accuracy of BEA's quantity and price measures in several important industries. The PPI's that CIAD needs to fill these gaps are listed below in priority order.

**Highest priorities**

1. Detailed wholesale trade PPI's, as listed below in priority order. CIAD will be evaluating the recently-introduced wholesale trade PPI's for the December 2007 update of the AIAs -- NAICS 423 (durables); 424 (nondurables); 425120 (agents and brokers) -- but more detailed deflation would significantly improve the quantity and price indexes for wholesale trade.

| <b>NAICS (WHOLESALE)</b> | <b>DESCRIPTION</b>                                                           |
|--------------------------|------------------------------------------------------------------------------|
| 4247                     | Petroleum and Petroleum Products Merchant Wholesalers                        |
| 4244                     | Grocery and Related Product Wholesalers                                      |
| 4234                     | Professional and Commercial Equipment and Supplies Merchant Wholesalers      |
| 42343                    | Computer and Computer Peripheral Equipment and Software Merchant Wholesalers |
| 42344                    | Other Commercial Equipment Merchant Wholesalers                              |
| 4238                     | Machinery                                                                    |
| 4236                     | Electrical and Electronic Goods Merchant Wholesalers                         |
| 4231                     | Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers      |
| 4232                     | Furniture and Home Furnishing Merchant Wholesalers                           |
| 4233                     | Lumber and Other Construction Materials Merchant Wholesalers                 |
| 4235                     | Metal and Mineral (except Petroleum) Merchant Wholesalers                    |
| 4237                     | Hardware                                                                     |
| 4239                     | Miscellaneous Durable Goods Merchant Wholesalers                             |
| 4241                     | Paper and Paper Product Merchant Wholesalers                                 |
| 4242                     | Drugs and Druggists' Sundries Merchant Wholesalers                           |
| 4243                     | Apparel, Piece Goods, and Notions Merchant Wholesalers                       |
| 4245                     | Farm Product Raw Material Merchant Wholesalers                               |
| 4246                     | Chemical and Allied Products Merchant Wholesalers                            |
| 4248                     | Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers            |
| 4249                     | Miscellaneous Nondurable Goods Merchant Wholesalers                          |

2. Detailed retail trade PPI's, as listed below in priority order. CIAD will incorporate BLS's recently-introduced summary retail trade PPI's in its 2006 annual update of the AIAs, but detailed deflation would also significantly improve the quantity and price indexes for retail trade.

| <b>NAICS (RETAIL)</b> | <b>DESCRIPTION</b>                            |
|-----------------------|-----------------------------------------------|
| 45411                 | Electronic Shopping and Mail-Order Houses     |
| 45291                 | Warehouse Clubs and Supercenters              |
| 45300                 | Miscellaneous Store Retailers                 |
| 454311                | Heating Oil Dealers                           |
| 454312                | Liquefied Petroleum Gas (Bottled Gas) Dealers |
| 454319                | Other Fuel Dealers                            |
| 44112                 | Used Car Dealers                              |
| 44229                 | Other Home Furnishings Stores                 |
| 44523                 | Fruit and Vegetable Markets                   |
| 45299                 | All Other General Merchandise Stores          |
| 45439                 | Other Direct Selling Establishments           |
| 441221                | Motorcycle Dealers                            |
| 441229                | All Other Motor Vehicle Dealers               |
| 445291                | Baked Goods Stores                            |
| 445292                | Confectionery and Nut Stores                  |
| 445299                | All Other Specialty Food Stores               |
| 453991                | Tobacco Stores                                |
| 44813                 | Children's and Infants' Clothing Stores       |
| 45114                 | Musical Instrument and Supplies Stores        |

3. Additional PPI's for professional and business services industries (NAICS54-56), particularly for NAICS 55.

551111 – Offices of Bank Holding Companies  
551112 – Offices of Other Holding Companies  
551114 – Corporate, Subsidiary, and Regional Managing Offices

4. PPI's for detailed lines of property and casualty insurance services. Currently BLS publishes 8 distinct PPIs here, but we'd like an expansion of detail following the lines of insurance shown in Best Aggregates and Averages. These lines do not have specific NAICS codes, but are covered under 524126 Direct Property and Casualty Insurance Carriers. For NAICS codes that are shown, we would like PPIs for 524127 Direct Title Insurance Carriers, 524128 Other Direct Insurance (except Life, Health, and Medical Carriers) with some product breakout, and 524130 Reinsurance Carriers.
5. PPI detail for commercial banks' depositor services (e.g., ATM transaction fees and service charges on deposit accounts). PPI detail for banks' loan services is excellent.
6. Detailed PPI's for securities brokerage services. We understand the present coverage as being commissions on trades for clients. We request 2 additional PPI's: for commission charges and for other brokerage services.
7. PPIs for Health care and social assistance (NAICS 62) at the 6-digit NAICS level of detail.
8. PPIs for Educational services (NAICS 61) at the 5- or 6-digit NAICS level of detail.

4. Should the particular characteristics of the industry be a determining factor in deciding where the expansion efforts should be employed? If a particular set of industries are conceptually easier to price in the PPI should they be given higher priority in determining which industries to survey? Or if some industries are conceptually more difficult to price,

should they be given a higher or lower priority in determining what to price? Or if an industry would use a pricing methodology that has already been developed and tested for another industry index, should industry indices be developed for the new industry since little additional research is required? Should consideration be given to whether or not a quality adjustment strategy is available for an industry index? For example, PPI produced health services indices for many years even though only limited quality adjustment could be applied until recently. However, the PPI program has never produced a custom software index because there is no accepted quality adjustment strategy available. Would a custom software index be meaningful and useful if there was no quality adjustment methodology for the industry?

Additional indices could easily be developed for subsector 524 using the current insurance methodology. These indices would be for the following industries:

| 2002 NAICS Code | Industry Title                                                     |
|-----------------|--------------------------------------------------------------------|
| 524127          | Direct Title Insurance Carriers                                    |
| 524128          | Other Direct Insurance (except Life, Health, and Medical) Carriers |
| 524130          | Reinsurance Carriers                                               |
| 524291          | Claims Adjusting                                                   |
| 524292          | Third Party Administration of Insurance and Pension Funds          |
| 524298          | All Other Insurance Related Activities                             |

However, no current methodology is known to price industries such as Colleges and Universities (part of NAICS 611, Educational services). So possible difficult industries to price would be:

| 2002 NAICS Code | Industry Title                                   |
|-----------------|--------------------------------------------------|
| 611210          | Junior Colleges                                  |
| 611310          | Colleges, Universities, and Professional Schools |

- Should the US PPI program be reviewing PPI data from other countries to determine where critical gaps exist in the US industry indices? Since Canada and Mexico share the same classification system, should the US PPI be producing indices for the same industries or have the same detailed industry indices as these other countries? Should the same comparison occur with OECD or Eurostat countries? Would similar industries with similar structures facilitate international comparisons?

Currently, Statistic Canada produces six services industry group indices. Five of the six service industry groups are also priced in the US. The sixth industry group that is not currently priced in the US would require pricing the following industries:

| 2002 NAICS Code | Industry Title                          |
|-----------------|-----------------------------------------|
| 541511          | Custom Computer Programming Services    |
| 541512          | Computer Systems Design Services        |
| 541513          | Computer Facilities Management Services |
| 541519          | Other Computer Related Services         |

6. Should additional quantitative data be used to determine which mix of additional industries or additional detail for existing industries should be pursued? Possible measures to use would be the growth rate of industries. If industries where the PPI current produces indices are growing at a more rapid rate than industries which haven't been surveyed by the PPI, would it be better to add additional indices to those growing industries? Another possible measure to use would be the change in the number of employees in an industry. If the number of employees in an industry is shrinking, does that indicate that the industry has less importance or would need fewer detailed industry indices? Conversely, if the number of employees are growing in an industry does that signify an increase in importance for an industry and therefore, additional indices are necessary to accurately represent that industry.

The following chart shows the industries with future employment and salary growth. Four of these industries are currently priced in the PPI.

| In PPI | NAICS | Industry                                                          | Employment<br>(in thousands) |         | Change |         |
|--------|-------|-------------------------------------------------------------------|------------------------------|---------|--------|---------|
|        |       |                                                                   | 2004                         | 2014    | Number | Percent |
|        | 61171 | Educational support services, private                             | 67.0                         | 120.0   | 53.0   | 79.1    |
| X      | 62161 | Home health care services                                         | 773.2                        | 1,310.3 | 537.1  | 69.5    |
| X      | 51121 | Software publishers                                               | 238.7                        | 400.0   | 161.3  | 67.6    |
| X      | 54161 | Management, scientific, and technical consulting services         | 779.0                        | 1,250.2 | 471.2  | 60.5    |
|        | 62331 | Community care facilities for the elderly                         | 582.6                        | 902.1   | 319.5  | 54.8    |
|        | 62149 | Outpatient care centers, except mental health and substance abuse | 298.4                        | 447.4   | 149.0  | 49.9    |
|        | 62142 | Residential mental health and substance abuse facilities          | 154.0                        | 230.8   | 76.8   | 49.9    |
|        | 62139 | Offices of all other health practitioners                         | 71.7                         | 107.0   | 35.3   | 49.3    |
| X      | 62321 | Residential mental retardation facilities                         | 337.1                        | 496.7   | 159.6  | 47.3    |
|        | 56121 | Facilities support services                                       | 115.6                        | 170.0   | 54.4   | 47.1    |

Source: BLS National Employment Matrix

## 4.4 Concluding Remarks

The expansion of the PPI coverage of the service-providing sector has been a significant and remarkable achievement. As it looks to the future, the PPI program plans to undertake an expansive review of the gaps that remain in its coverage of the U.S. economy, both in service-providing and goods-producing sectors. This paper has attempted to lay out the history of the PPI service sector expansion and some approaches that can be taken to address closing coverage gaps in the future. As this chapter has indicated, there are some clear alternative methods that can be used to develop data driven guidance in determining the priorities for future index development. However, the ultimate judgment and course that is taken will require substantial dialog with our statistical partners, the academic community, business, and policy users of our data.