

# **NBER-CRIW Joint Conference on International Service Flows**

## **International Price Program's (IPP's) Services Price Indexes**

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**Authors:  
Kelley Khatchadourian  
Alice Wiesner**

**U.S. Bureau of Labor Statistics  
2 Massachusetts Avenue, N.E.  
Washington, DC 20212**

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## **Abstract**

This paper focuses on the topic "measurement and analysis of prices for internationally traded services." The goal is to inform the audience about international services price indexes and the measurement issues that arise when developing new international services price indexes. In addition, we hope to receive suggestions on how to deal with these issues. This paper covers six sections. The first section provides a brief introduction. The second section describes the background of the International Price Program (IPP) and the services price indexes produced by the program. The third section describes the services indexes that IPP currently produces and publishes. The fourth section details the international services price indexes that are in research and development. The fifth section discusses measurement issues involved in developing international services price indexes such as defining the service, defining the transaction, and the availability of data. The sixth section discusses how IPP plans to tackle those measurement issues and lists the next steps for developing services price indexes.

## **Executive Summary**

Services are an important but under-measured portion of U.S. trade. As the U.S. economy becomes more global and service-oriented, it is important to gauge and capture this trend. The U.S. Bureau of Labor Statistics (BLS) International Price Program (IPP) produces international price indexes for four services industries: air passenger fares, ocean liner freight, air freight, and crude oil tanker freight. The methodologies for weighting, sampling, and pricing these indexes are unique for each service.

The services price indexes currently produced by IPP cover approximately 8 percent of export services trade and 23 percent of import services trade. In order to expand the coverage of trade in services, IPP is developing indexes for export travel and tourism and export education, researching the methodology for an import travel and tourism index, and investigating the feasibility of price indexes for export financial services and export royalties and license fees.

The research and development process has been hampered by several measurement issues affecting the creation of price indexes for internationally traded services. One major issue in measuring any international service is how to define the service. The same service can be defined differently by various organizations and people depending upon their purpose and perspective. To complicate this issue further, when trying to measure international services according to a Gross Domestic Product definition, it is often difficult to identify the parties involved in each transaction and their residency. Another definitional issue involves services that overlap each other. Also, there are various classification systems that define and organize services data each in their own way.

Another major issue when creating services price indexes is how to define the transaction and what price to obtain. Services are intangible and not as easily identifiable as goods. Defining a service transaction is also difficult because sometimes the service output is in question. In addition, many services transactions are unique and only occur one time.

The lack of available data for services is an additional obstacle to creating price indexes. Data collection is limited or nonexistent when trade does not physically cross borders. The lack of available data sources forces us to make assumptions about the behavior of the unknown data and affects decisions on what transactions to include in an index. Furthermore, sometimes a source may provide some data on international services, but the data are not detailed enough to create a price index. Finally, the prevalence of intra-company transactions and transfer pricing in some services areas makes obtaining an accurate price more difficult.

The creation of price indexes for services is further complicated by the technical nature of many services industries and the lack of specialized knowledge in these areas by the economists working on developing price indexes for these industries.

The International Price Program is currently taking steps to address these measurement issues. In addition, we hope to receive suggestions on how to deal with these issues.

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## 1. Introduction

Services are an important part of the international economy. In 2004, the United States exported \$323.4 billion in services and imported \$258.1 billion in services.<sup>1</sup> Services comprised about 17 percent of all imports and 30 percent of all exports. Between 1993 and 2003, U.S. trade increased dramatically, including trade in services. During these years, services exports increased 73 percent and services imports increased 115 percent. Furthermore, while there has been much discussion about the overall trade deficit, the U.S. enjoys a trade surplus in services, exporting \$65.3 billion more in services than it imports.

An even larger and growing part of trade in services is sales through affiliates. Because sales through affiliates involve residents of the same country, this type of trade falls under the Gross National Product (GNP) definition of trade, not the Gross Domestic Product (GDP) definition employed in the trade values reported above. Sales through affiliates account for around 60 percent of international sales of services. In 2003, U.S. sales of services to foreign markets were \$292 billion across border and \$477 billion through affiliates. Foreign sales to the U.S. market were \$225 billion across border and \$381 billion through affiliates.

Services statistics are needed to understand many economic issues, but currently there is a dearth of available data. More measures are needed to understand the overall growth in services trade as well as changes in specific services industries. As the U.S. economy becomes more global and service-oriented, it is important to gauge and capture this trend. It is also important to measure services to analyze the outsourcing of jobs from the United States to other countries, and to determine its impact on the U.S. and world economies. These are just a few of the issues that additional services data would help us to understand more clearly.

This paper's main focus is to describe the international services price indexes currently published by the U.S. Bureau of Labor Statistics (BLS) International Price Program (IPP) and to discuss additional service areas that IPP is investigating. The goal of this paper is to inform the audience about international services price indexes and the measurement issues that arise when developing new international services price indexes. In addition, we hope to receive suggestions on how to address these issues.

This paper covers five major topics. Section 2 describes the background of the International Price Program and services price indexes. Section 3 describes the services indexes that IPP currently produces (i.e. transportation price indexes). Section 4 describes the development process and the indexes that are in the various stages of that process. Section 5 describes measurement issues involved in developing services price indexes such as defining the service, defining a transaction, and finding available data.

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<sup>1</sup> All trade dollar values are from the Bureau of Economic Analysis, *Survey of Current Business*, "U.S. International Transactions" and "U.S. International Services," October 2005.

The final section, Section 6, discusses how IPP plans to tackle those measurement issues and lists the next steps for developing services price indexes.

## **2. Background**

Price indexes measure the price change of a market basket of goods or services from one point in time to another. Individual transaction prices are tracked on a regular basis, and weighted by relative importance in the marketplace. Due to the sheer number of transactions in the economy as a whole, a small sample of prices is generally used to represent the entire market basket. Price indexes can be calculated for groups of similar commodities (such as electronics) or service industries (such as air passenger fares). They can also be calculated for different geographic regions (such as prices for all imports from Japan).

The Bureau of Labor Statistics publishes data on price changes for consumers (the Consumer Price Index - CPI), for producers (the Producer Price Index – PPI), and for importers and exporters (the Import/Export Price Indexes produced by the International Price Program – IPP). Each of the three programs has been designated as a Principal Federal Economic Indicator. In addition, each of these programs publishes price indexes for services.

The International Price Program produces import and export goods and services price indexes. These price indexes measure the change over time of the prices of goods or services sold to U.S. residents by foreign sellers (imports) or sold to foreign buyers by U.S. residents (exports). Import and export price indexes are used for a variety of purposes, but are used primarily to deflate trade statistics and calculate real Gross Domestic Product (GDP). In addition, import and export price indexes are used to measure price trends, as a tool for fiscal and monetary policy, to measure competitiveness, to analyze exchange rate changes, and to calculate price elasticities.

In addition to import and export indexes (which adhere to a balance of payments definition), IPP publishes inbound and outbound price indexes for several of the transportation services industries. Inbound price indexes measure price changes on flights, air shipments, and ocean shipments that are coming into the U.S. regardless of the nationality of the carrier. Consequently, import and export indexes are a subset of the inbound and outbound indexes. More information on each of these indexes is provided in the next section.

The Consumer Price Index and Producer Price Index also produce price indexes for services. CPI measures price changes faced by consumers; therefore, it includes domestic and imported services for U.S. household consumption. PPI measures price changes received by U.S. producers; therefore, it includes U.S. production of services for domestic consumption or export. IPP measures price changes for all import and export of services.

The three programs differ in terms of the primary classification systems used to classify transactions. The primary CPI classification system is expenditure-based, the primary PPI system is industry-based, and the primary IPP system is product-based.

The main difference between the services indexes produced by the three programs is their coverage of services transactions. CPI and PPI produce price indexes for the majority of services transactions within their scope. CPI produces indexes that cover all domestic consumption of services and PPI produces indexes that cover 76.7 percent of services production in the U.S. IPP, on the other hand, published indexes for only a small portion of trade in services: approximately 8 percent of exports and 23 percent of imports. CPI and PPI are able to cover a much larger portion of services transactions because most of the weighting and sampling data for these indexes comes from one source. CPI is able to use the Consumer Expenditure Survey and the Telephone Point-of-Purchase Survey as the weighting and sampling sources, respectively, for almost all its goods and services indexes. PPI also has the advantage of using the Unemployment Insurance File and Census data for weighting and sampling both goods and services indexes. While IPP has a complete data source for weighting and sampling goods indexes, there is no single source that can be used for all services import/export indexes. IPP must obtain data from the Department of Transportation, Maritime Administration, and the Department of Energy to produce price indexes for the four currently-published services industries. The variety of data sources used to construct price indexes for services requires unique and detailed methodologies for each services industry.

**CHART 1: Summary of Services in the U.S. Consumer Price Index, Producer Price Index, and Import/Export Price Indexes**

	<b>Consumer Price Index</b>	<b>Producer Price Index</b>	<b>Import/Export Price Indexes</b>
<b>Transactions Included</b>	Domestic and imported services for U.S. household consumption	U.S. production of services for domestic consumption or export	Import and export of services
<b>Prices Measured</b>	Paid by Consumers	Received by Producers	Paid by Importers, Received by Exporters
<b>Primary Classification</b>	Expenditure-based	Industry-based	Product-based
<b>Coverage of Services</b>	100%	76.7 % of in scope Services GDP	8% of exports, 23% of imports
<b>Data Sources for Sampling and Weighting</b>	<i>Sampling and Weighting</i> - Consumer Expenditure Survey (item selection and weighting) Telephone Point-of-Purchase Survey, plus a few universe sources (outlet sampling)	<i>Sampling</i> - Unemployment Insurance File for the majority of services, alternative frame sources from various sources for the remainder <i>Weighting</i> - Census data	<i>Sampling and Weighting</i> - Department of Transportation, Maritime Administration, Department of Energy

The International Price Program has produced and published services price indexes since 1986. IPP currently produces price indexes for the following services: air passenger fares, air freight, ocean liner freight, and crude oil tanker freight. IPP is in the process of developing export travel and tourism, and export education price indexes. IPP is also researching the possibility of developing additional price indexes for import travel and tourism, export financial services, and export royalties and license fees.

### **3. Currently Published Services Price Indexes**

As noted above, the International Price Program currently publishes price indexes for four transportation services.<sup>2</sup> IPP is able to produce price indexes for transportation services because data needed to create these indexes are collected by other government agencies. International transportation services involve transporting a physical object (e.g., person, package, or barrel of oil) from one place to the next on a plane or a ship. Because the nature of transportation involves the moving of physical objects, it is relatively easier to track these services. Various agencies within the U.S. government collect information on transportation transactions; therefore, IPP can use this information for sampling frames, weighting sources, and even pricing sources for the currently published services price indexes.

For all currently published services price indexes, except crude oil tanker freight, sampling occurs approximately every five years and each new sample entirely replaces the old sample. In addition, trade dollar value weights for these indexes are currently updated every five years. Presently, weights are based on year 2000 values. Like all IPP import/export indexes, these services indexes are disaggregated into their component parts. In the case of transportation, this means divisions according to the world region from which the vessel or aircraft originated or by regional destination.

The following sections describe each of the four services industries for which IPP publishes price indexes. They detail the background and definitions of each index such as the first date and frequency of publication, the dollar value of each service, and the sampling, weighting, and pricing data sources.

#### **3.1 Air Passenger Fares**

##### **3.1.1 Background and Definition**

The Import/Export and Outbound/Inbound Air Passenger Fares Indexes measure changes in airline fares for international air passenger travel.<sup>3</sup> These indexes were among the first services price indexes published by the International Price Program. The Export Air Passenger Fares Index was first published in 1986, followed by the Import Air Passenger

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<sup>2</sup> The press release of the U.S. Import and Export Price Indexes can be found at <http://www.bls.gov/mxp/#news>.

<sup>3</sup> More information on the Air Passenger Fares Indexes can be found at <http://www.bls.gov/mxp/apfact.htm>.



Fares Index in 1988. Originally, the air passenger fares indexes were published quarterly, but they were subsequently published on a monthly basis beginning in March 2001.

The U.S. Import/Export Price Indexes include two types of air passenger fares indexes: balance of payments indexes and international services indexes. The balance of payments indexes are import and export indexes, which take into account the residency of the traveler and the nationality of the carrier. The IPP air passenger fares indexes assume that passengers begin their trip from their country of residence. Therefore, the import indexes include airfares for passenger transportation provided by foreign carriers on flights out of the U.S. The export indexes include airfares for passenger transportation provided by U.S. air carriers on flights into the U.S. as well as between two foreign countries. The international services indexes measure fare changes in terms of the direction of travel, inbound versus outbound. For example, the fare for a flight from New York to Paris on Air France would be included in the Import Air Passenger Fares Index, while the fare for a flight from New York to Paris on any airline would be included in the Outbound Air Passenger Fares Index.

In 2004, the import passenger fares industry, which includes air and ocean passenger fares, accounted for 9.2% (\$23.7b) of all U.S. services imports. The export passenger fares industry accounted for 5.8% (\$18.9b) of all U.S. services exports.

### **3.1.2 Sampling, Weighting, and Pricing Sources**

The Import/Export and Outbound/Inbound Air Passenger Fares Indexes use the U.S. Department of Transportation's Data Bank 1B (DB1B) as a primary sampling source. The DB1B includes ticket coupons as part of the U.S. Department of Transportation's Origin and Destination Survey (O&D) and provides data on passenger counts, revenues, origin and destination airports, and fare classes for international trips. Another source of sampling information is the U.S. Department of Transportation's T-100 International Market file. The trade dollar value weights used for index calculation are derived from the Transportation Department's DB1B and T-100 International Market file. For example, an sampled price in the IPP import air passenger fares index would be a round-trip first class flight from New York to London on British Airways.

Pricing data for the air passenger fares indexes are obtained from an electronic reservations system that is widely used in the industry. Frequent flyer tickets and those sold by consolidators are excluded from the air passenger indexes because they are not included in the pricing source. These indexes, like all IPP indexes, exclude taxes. Prices for all items are collected during the first week of each calendar month, consistent with usual IPP practice for pricing of goods trade.

## **3.2 Ocean Liner Freight**

### **3.2.1 Background and Definition**

The Inbound Ocean Liner Freight Index measures changes in ocean liner freight rates for shipments to the United States.<sup>4</sup> The ocean liner freight index was first published in 1990 on a quarterly basis and switched to publishing on a monthly basis in January 2005.

The Inbound Ocean Liner Freight Index reflects changes in rates paid for the transportation of freight from foreign countries into the U.S. on ocean liner vessels regardless of the nationality of either the shipper or the vessel operator. This definition adheres to the international services index definition; therefore, it does not take into account the nationality of the shipper or the vessel operator.

Ocean liner vessels operate by definition via regular schedules. They differ from tramp and tanker ocean shipping services in that these latter vessels operate irregular schedules determined by negotiation between the shipper and ship owner and generally carry bulk goods and liquid commodities, respectively. IPP only measures inbound container loads. The scope of the service measured is ocean transportation from port to port only. An example of an inbound liner freight transaction would be the shipping rate for a 20-foot container load of tires from Kyoto, Japan, to Long Beach, CA, including a bunker adjustment factor, origin receiving charges, destination delivery charges, and a peak season surcharge.

IPP uses import ocean liner freight revenues as a size proxy for inbound ocean liner freight revenues since almost all vessels are foreign-operated. The import ocean freight industry, which includes liner, tanker, tramp, and charter hire freight, accounted for 11.8% (\$30.5b) of all U.S. services imports in 2004.

### **3.2.2 Sampling, Weighting, and Pricing Sources**

IPP uses the U.S. Maritime Administration's TM381 file from the Department of Transportation as the sampling source for the Inbound Ocean Liner Freight Index. The trade dollar value weights for index calculation are derived from a regression analysis of data from the same source as the sampling frame, the TM381 file.

Pricing data for the Inbound Ocean Liner Freight Index are obtained directly from ocean liner freight operators on a monthly basis, reflecting transaction prices for the first week of the month. The index uses a net freight rate, adjusted by applicable commissions, discounts, or surcharges. The rate does not include ground transportation or port services.

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<sup>4</sup> More information on the Inbound Ocean Liner Freight Index can be found at <http://www.bls.gov/mxp/olfact.htm>.

### **3.3 Air Freight**

#### **3.3.1 Background and Definition**

The Import/Export and Inbound/Outbound Air Freight Indexes measure changes in air freight rates for air delivery to and from the U.S.<sup>5</sup> The Import Air Freight Index was first published in 1990, followed by the Export Air Freight Index in 1997. These indexes changed from quarterly publication to monthly publication starting with January 2006 indexes (released in February 2006).

The Import Air Freight Index measures changes in rates paid for the transportation of freight from foreign countries to the U.S. on foreign air carriers. The Export Air Freight Index measures changes in rates paid for the transportation of freight from the U.S. to foreign countries on U.S. air carriers, as well as for freight transportation between two foreign countries provided by U.S. air carriers.

IPP publishes the Inbound/Outbound Air Freight Indexes as an alternative to the Import/Export Air Freight Indexes. The Inbound Air Freight Index measures changes in rates paid for the transportation of freight from foreign countries into the U.S. on any air carrier. The Outbound Air Freight Index measures changes in rates paid for the transportation of freight from the U.S. into foreign countries on any air carrier. For example, the rate from New York to Paris on any carrier would be included in the Outbound Air Freight Index while the rate from Paris to New York on any carrier would be included in the Inbound Air Freight Index. The Inbound and Outbound Air Freight Indexes are most useful for international trade, market, and economic analyses of the cost of transporting freight to and from the U.S.

Air freight consists of shipments of commodities, including small packages tendered to an airline for transportation. Freight includes express shipments, but does not include mail or passenger baggage. The scope of the service measured is air transportation only. Therefore, the service being priced is from airport to airport only and does not include any ground transportation or port services.

Import air freight consisted of 2.3% (\$5.98b) of all U.S. services imports in 2004, whereas export air freight consisted of 2.4% (\$7.6b) of all U.S. services exports in 2004.

#### **3.3.2 Sampling, Weighting, and Pricing Sources**

IPP uses the U.S. Department of Transportation's (DOT) T-100 International Market file as the sampling source for both the Import/Export and the Inbound/Outbound Air Freight Indexes. The trade dollar value weights used for index calculation are derived from a regression analysis based on data from the Fraud Intelligence file of the U.S. Customs Service and the DOT's T-100 International Market file.

Pricing data for the air freight indexes are obtained directly from air carriers and reflect transaction prices for the first week of the month in which they are collected. To

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<sup>5</sup> More information on the Air Freight Indexes can be found at <http://www.bls.gov/mxp/affact.htm>.

determine the net freight rate, the contract rate, the spot rate, or sometimes the tariff freight rate is reported along with information about commissions, discounts, and surcharges.

### **3.4 Crude Oil Tanker Freight**

#### **3.4.1 Background and Definition**

The Inbound Crude Oil Tanker Freight Index measures changes in the average price charged for the delivery of crude oil on tanker freight vessels to the U.S.<sup>6</sup> The tanker index was first published in 1987 with a lag of three months. In 2002, IPP began calculating the index monthly, published with a two-month lag.<sup>7</sup>

Crude oil tanker freight consists of bulk crude oil shipments measured in barrels. Other liquids transported in tankers, such as chemicals and liquid natural gas, are not included in this index. The scope of the service measured is ocean transportation; therefore, the service being priced is from port to port only, and does not include any ground transportation or port services.

The Inbound Crude Oil Tanker Freight Index reflects changes in rates paid for the transportation of crude oil loaded from foreign countries and shipped to the U.S. on tanker vessels regardless of the nationality of either the shipper or the vessel operator. This definition adheres to the international services index definition; therefore, unlike the balance of payments indexes, it does not take into account the nationality of the shipper or the vessel operator.

The Inbound Crude Oil Tanker Freight Index comprises the entire universe of tanker transactions reported to the U.S. Department of Energy (DOE). IPP receives a monthly file from DOE that includes data on all reported crude petroleum and oil tanker transactions into the U.S. over the previous period. IPP uses this file to calculate both the Inbound Crude Oil Tanker Index and the Import Crude Petroleum Index.

IPP uses import tanker revenues as a size proxy for inbound tanker revenues since almost all vessels are foreign-operated. The import ocean freight industry, which includes liner, tanker, tramp, and charter hire freight, accounted for 11.8% (\$30.5b) of all U.S. services imports in 2004.

#### **3.4.2 Sampling, Weighting, and Pricing Sources**

Since the transactions included in the Inbound Crude Oil Tanker Freight Index represent the entire universe of transactions, no sampling is necessary for this index. The revenue weights used for index calculation are derived from a regression analysis based on one

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<sup>6</sup> More information on the Inbound Crude Oil Tanker Index can be found at <http://www.bls.gov/mxp/tankfact.htm>.

<sup>7</sup> The Inbound Crude Oil Tanker Index is published with a two-month lag due to the availability of the data from the Department of Energy.

year's worth of tanker transactions from DOE. The tanker index is an average price index. A weighted average of transactions sharing the same region of origin and delivery is used for comparison each month rather than comparing single transactions. For example, an average price would be calculated for all tanker freight transactions from the Middle East to the U.S. Gulf of Mexico. The average price of all like transactions delivered in a given month is compared over time. Transactions are weighted by quantity of barrels and price per barrel.

#### **4. Services Price Indexes in Research and Development**

The International Price Program is currently planning to produce price indexes for two new services areas: export education and export travel and tourism. In addition, IPP is working on the methodology for an import travel and tourism price index and researching the feasibility of developing export financial services and export royalties and license fees price indexes. The process of developing an international price index is very long and difficult. The teams need to be knowledgeable about the service industry, define the service and the transactions of that service, and then find available data to measure and price the service. These issues and more are described in detail in section 5.

##### **4.1 Services Index Development Process**

The services development process is a four-staged approach. In the first stage, the background stage, the team gathers information on the nature of the service and determines what to measure in an ideal price index. In the second stage, the data sources stage, data sources are analyzed to determine if they are appropriate inputs to accurately produce a price index. After the background and data sources stages, IPP reviews the feasibility of producing a price index for the service. The third stage, the methodology stage, begins if it is determined that an index is feasible to produce. The methodology stage details how the index is going to be measured. It covers sampling strategy, weight calculation methods, and the solutions to various measurement issues. The fourth and final stage, the software development stage, creates and updates the software used to process and calculate the indexes.

These stages may take several years to complete. This process is iterative and sometimes it is necessary to return to an earlier stage if new information needs to be addressed. In addition, IPP develops the software used to process the indexes in-house; therefore, changes and updates to the software are time and resource intensive.

##### **4.2 Services Price Indexes in the Methodology and Software Development Stages**

###### **4.2.1 Export Travel and Tourism**

###### **4.2.1.1 Background and Definition**

The Export Travel and Tourism (ET&T) Index will measure price changes in food, lodging, transportation, entertainment and recreation, gifts and souvenirs, and other types of expenditures by foreign travelers in the United States. Since foreigners are generally

charged the same prices for these services and items as U.S. residents, this index will use a representative selection of prices and indexes from the BLS Consumer Price Index (CPI). The trade weights for this index will be specific to spending by foreign visitors. This index will exclude expenditures by foreigners traveling to the U.S. for education, for medical treatment, or for government or military affairs because these expenditures fall under other services.

This index is currently in the software development stage and IPP plans to publish this index in early 2007. The index will initially be published by the region of the origin of the traveler. IPP is also considering publishing this index by expenditure type (food, lodging, transportation, entertainment and recreation, gifts and souvenirs, and other spending).

Export travel and tourism consisted of 23% (\$74.5b) of all U.S. services exports in 2004. This index will cover the largest dollar value of any services index produced by IPP.

#### **4.2.1.2 Sampling, Weighting, and Pricing Sources**

IPP will not select a sample for the Export Travel and Tourism Index. The prices and indexes included in this index come from the sample selected by the Consumer Price Index for the following categories: food, lodging, transportation, entertainment and recreation, gifts and souvenirs, and other spending. Prices for airfares will be excluded from this index since price changes for airfare are already tracked by the air passenger fares price indexes. Prices for tour packages will be excluded from this index because the CPI does not collect prices for these items.

Weights for the ET&T index will be calculated using the In-Flight Survey data collected by the Office of Travel and Tourism Industries of the U.S. Department of Commerce. Weights will also be derived using data from Statistics Canada and SECTUR, the Mexican Ministry of Tourism. These sources will also be used to construct the weights for the Import Travel and Tourism Index, also in research and development.

IPP traditionally uses a modified Laspeyres formula to calculate the indexes. The CPI, however, calculates almost all of its elementary-level indexes using the geometric means formula. Since the ET&T index will use prices and indexes from the CPI, the elementary-level ET&T indexes will be calculated using the geometric means formula. The upper-level indexes will still use the modified Laspeyres index formula.

This index will be produced on a monthly basis and will be lagged by one month since IPP cannot begin processing the data until after CPI publishes its indexes.

## **4.2.2 Export Education**

### **4.2.2.1 Background and Definition**

The Export Education Index will measure price changes in tuition, fees, and room and board for foreign students enrolled at U.S. colleges and universities.<sup>8</sup> This index will include only school-charged services and will exclude other living expenses at this time. Also, financial aid will not be taken into account, nor will foreign government assistance, since research indicates that such funds typically are not part of foreign students' purchases of U.S. educational services.

Like the ET&T index, the Export Education Index is in the software development stage. IPP plans to publish this index in mid-2007. The index will be aggregated in three different ways: 1) tuition & fees/room & board, 2) undergraduate/graduate, 3) public/private. In addition, regional breakouts may be available.

Export education consisted of 4.2% (\$13.5b) of all U.S. services exports in 2004.

### **4.2.2.2 Sampling, Weighting, and Pricing Sources**

The weights for the Export Education Index will be derived from the U.S. Department of Education's Integrated Post Secondary Data System (IPEDS). This survey collects data from colleges on tuition, fees, living costs, and the number of foreign students. Unlike the other IPP services indexes, this index will have new weights every year. Since IPEDS includes price information for nearly all colleges and universities in the U.S., no sampling will be required. Prices for the Export Education Index will also come from IPEDS. Prices will be collected on an annual basis at the beginning of each year. New indexes will be calculated once a year.

## **4.2.3 Import Travel and Tourism**

### **4.2.3.1 Background and Definition**

The Import Travel and Tourism (IT&T) Index will measure price changes for expenditures by U.S. residents traveling internationally. This index will be comprised of different expenditure categories for two distinct groups of travelers. For persons traveling on a tour package, the index will track changes in prices of tour packages and all other travel expenditures. For persons not traveling on a tour package, the index will track changes in prices of food and beverage, lodging, transportation, entertainment, and gifts, souvenirs, and other expenditures. This index will exclude expenditures by U.S. residents traveling abroad for education, for medical treatment, or for government or military affairs because these expenditures fall under other services.

The Import Travel and Tourism Index is unique in that it will use a combination of directly collected prices from travel agents and secondary source prices from foreign

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<sup>8</sup> Mandatory charges assessed to students to cover a wide variety of institutional services such as athletic fees and health fees.

consumer price indexes. This index will be lagged one month due to the lack of foreign consumer price index data in the current period.

This index is in the latter part of the methodology stage and will begin systems development in the next year. IPP anticipates publishing the IT&T index within the next few years.

In 2004, import travel and tourism accounted for 25.4% (\$65.6b) of all U.S. services imports.

#### **4.2.3.2 Sampling, Weighting, and Pricing Sources**

Pricing data for the Import Travel and Tourism Index will be gathered from two different types of sources. Prices for lodging and tour packages will be collected directly from travel agents located in the United States. Ideally, airfare should be excluded from the weight and prices of tour packages. IPP will attempt to remove airfare, but, where it cannot be removed, airfare may be included in this index. Prices for other expenditures by travelers using a tour package and for food and beverage, transportation, entertainment, and gifts, souvenirs, and other spending by travelers not using a tour package will be taken from consumer price indexes published by the countries that are major travel destinations for U.S. travelers. IPP will select the foreign CPIs that will be included in this index based on the dollar value of trade for each country and the availability of CPI data from that country.

The Import Travel and Tourism Index will use the BLS Longitudinal Database (LDB) as a sampling frame for travel agencies from which IPP will request prices for lodging and tour packages. The LDB is the sampling frame for many BLS surveys such as the Producer Price Index and the Current Employment Statistics survey. The LDB includes the name, address, and number of employees for all travel agencies operating in the United States. The LDB uses microdata from the Covered Employment and Wage (ES-202) program to track the employment and wages of business establishments over time.

In order to create revenue weights for this index, IPP will use data from the U.S. Department of Commerce In-Flight Survey of U.S. residents traveling abroad as well as from Statistics Canada and SECTUR, the Mexican Ministry of Tourism. These are the same weighting sources that will be used for the Export Travel and Tourism Index.

### **4.3 Services Price Indexes in the Background and Data Sources Stage**

#### **4.3.1 Export Financial Services**

The umbrella term “financial services” includes a large and diverse group of distinct services. According to the Bureau of Economic Analysis (BEA), financial services consist of the following services: brokerage services, underwriting and private placement services, financial management services, credit-related services, credit card services, financial advisory and custody services, securities and lending services, and electronic



funds transfer services. IPP has focused on two areas with large trade dollar values: financial management services and brokerage services.

An export financial management service occurs when a U.S. financial manager has direct authority to administer financial portfolios (such as cash, securities, futures) for a foreign resident. An export brokerage service is when a U.S. broker executes orders from foreign residents to purchase or sell securities, options, futures, and other financial instruments.

Both of these financial services are in the background and data sources stage. IPP has not yet determined if they are feasible to produce. Some of the issues that have emerged during the research include a lack of detailed data to weight the indexes at the lowest level and difficulty defining what transaction to price. These issues are described in the following measurement issues section.

Unaffiliated export financial services consisted of 6.8% (\$21.9b) of all U.S. services exports in 2004.

#### **4.3.2 Export Royalties and License Fees**

Like financial services, royalties and license fees also consist of many different services. A few examples of royalty and license fee transactions include sales of intellectual property such as industrial processes/designs, software licenses, trademarks, franchises, books, recorded music, and performances. An export royalties and license fees index would measure price trends on payments that a U.S. individual or company receives from a foreign individual or company in return for the use of intellectual property.

Currently, IPP is focusing on software license fees, which is one of the largest areas of trade. Unfortunately, software licenses are often bundled with other goods and services, making them difficult to track. IPP is investigating an expanded definition to include ancillary services such as help desk, upgrade, custom programming, and maintenance services. This project is also in the background and data sources stages and IPP has not yet determined if this index is feasible to produce. Similar to financial services, low-level trade dollar value weights for royalties and license fees are not currently available. Measurement issues with royalties and license fees include their tendency to cross multiple industries (such as industrial processes), and that they are often attached to a commodity from which it is difficult to separate the price of the service. Some of the measurement issues that need to be resolved before feasibility is decided are described below.

In 2004, unaffiliated export royalties and license fees accounted for 4.2% (\$13.6b) and affiliated export royalties and license fees accounted for 12.1% (\$39b) of all U.S. services exports. The entire export royalties and license fees industry summed up to 16.3% of all U.S. service exports (\$52.6b).

## **5. Measurement Issues & Examples**

Many services measurement issues are problematic not only for price indexes, but for measuring any type of economic activity for services. There are, however, specific nuances that are especially important and create difficulties in producing an international services price index. When creating a price index, very detailed information is needed to select and track a representative transaction over time. This creates many ongoing measurement issues for IPP.

### **5.1 Defining the Service**

One major issue in measuring any international service is how to define the service. The same service can be defined differently by various organizations and people depending upon their purpose and perspective. Services are difficult to define because they are intangible, like computer software royalties. Some services are a bundle of goods and services, like travel and tourism. Others cross multiple industries, like royalties for industrial processes. It is often difficult to determine the exact service that is being provided and the factors that affect its price.

When deciding how to define the service, IPP also needs to keep the customers in mind. The Bureau of Economic Analysis (BEA) is the primary user of IPP services indexes, though other organizations and people also use these indexes for different purposes. Sometimes the availability of data limits what can be measured (see section 5.3).

To complicate this issue further, when trying to measure international services according to balance of payments (i.e., import and export), it is often difficult to identify the parties involved in each transaction and their nationalities. IPP needs to determine the residency of the purchaser or seller of the service to ensure that import and export prices are being tracked. For example, in the ocean liner industry and the crude oil tanker freight industry, there are very few U.S. operated vessels. It is difficult to determine the actual nature of trade flows since most vessels appear to be foreign, but may actually be controlled indirectly by U.S. firms. Ideally, we want to produce an import index, but since we cannot ascertain the nationality of the operator of the liner or tanker vessel, we produce an inbound index which can be used as a proxy for an import index.

Another definitional issue involves services that overlap each other. For example, many people view airfare as part of travel and tourism services, but others argue they should be measured separately. Although IPP ideally wants to measure these two industries separately, sometimes the data do not allow it.<sup>9</sup> Fortunately, since IPP does not have an aggregate services index, occasional duplication like this is not yet a serious problem. Another example of overlap between industries occurs with royalties and license fees. These services are a byproduct of many different industries. Many royalties and license fees are paid for intellectual property that is presented in physical form, such as a book or a diskette. In these cases it is difficult to distinguish between the good and the service.

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<sup>9</sup> IPP's export travel and tourism index will exclude airfare from the weights and prices since tour packages will not be included in the index. IPP's import travel and tourism index, however, may include airfare in the weights and prices for tour packages when it is impossible to remove the airfare from the price.

In addition, there are many different classification systems that define and organize services data each in their own way. The North American Industrial Classification System (NAICS), the North American Product Classification System (NAPC), International Standard Industrial Classification System (ISIC), and the Balance of Payments, Version 5 (BOP5) all define services in an organized and clear fashion, although they vary in their definitions and levels of detail. Unfortunately, with the exception of BOP5, none of these classification systems specifically focuses on imports and exports and, therefore, no import and export data is collected according to those classification systems.<sup>10</sup> Other major classification systems used in trade statistics, such as the Harmonized Tariff Schedule, do not include services whatsoever.

Another smaller, yet still important, definitional issue is that different organizations disaggregate their data into different groupings. For example, BLS, BEA, Census, and IPEDS (the data source for the Export Education Index) all use different regional groupings for the U.S., which makes data processing difficult for IPP.

## **5.2 Defining the Transaction**

Another major issue that IPP faces when creating services price indexes is how to define the transaction and what price to obtain. The specific transaction to be captured and measured over time is sometimes easy to define. For example, a tanker transaction is fairly straightforward. A single price is charged per barrel of oil carried on the ship. In other cases, transactions may be difficult to define. For example, a software license fee is hard to define because it is difficult to separate individual costs of the license, the diskette, the user manual, and help desk services, all of which may be bundled into one transaction price.

There are many reasons why it is often difficult to define a transaction. Services are intangible and not as easily identifiable as goods. IPP must specify the details of every part of the service so that we can track a consistent transaction over time. IPP must be able to separate true price changes from quality adjustments made to the service or changes to the service bundle.

Another reason why it is difficult to define a service transaction is that sometimes the service output is in question. For example, financial management service providers charge a percentage of the portfolio (also known as basis points) as their service fee for managing that portfolio.<sup>11</sup> As the value of the portfolio increases, the management fee (a steady percentage of the assets) paid increases as well. In identifying the output to be measured, IPP must answer whether the greater management fee paid is a price increase, or whether the larger portfolio value implies a greater amount of management service performed. For export financial services, there are other additional complicated types of

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<sup>10</sup> The U.S. Census Bureau collects exported revenue figures by NAICS code but only at an aggregate level. NAICS was specifically designed to collect information based upon the U.S. economy.

<sup>11</sup> A financial management service is when the provider of the service (the financial manager) has direct authority to manage financial portfolios for another entity.

investments that make answering this question even more difficult. The output is also difficult to define even for the companies that trade the services. Intellectual property is traded in virtually every industry; however, most firms do not consider it to be their primary output. For example, a shoe company considers itself to be in the business of shoes, although they may sell specs for shoe manufacturing or formulas for rubber soles. Firms generally do not maintain inventories or price lists for their intangible stock of intellectual property. As such, it is difficult for IPP to get reliable information from companies involved in trade of royalties and license fees.

In addition, services transactions are difficult to define because many services transactions are unique and only occur one time. This issue also can occur with goods, but the problem arises when trying to decide if a service item is similar enough to be the same item, since price indexes track price changes over time of the same service.

### **5.3 Data Availability**

The lack of available data for services is a significant obstacle to creating price indexes. This issue is tied closely to the complexity involved in defining the service and the transaction described in the preceding sections. The lack of available data can cause problems in defining the service and the transaction, but also the definitional problems may lead to the unavailability of data.

Often the absence of data is influenced by the modes through which trade in services is transacted. Under the GDP definition, trade in goods only occurs across borders. Services, on the other hand, can be traded via cross-border supply, consumption abroad, or presence of natural persons. For cross-border trade, data is often collected at the border by customs and other officials. When trade occurs through the other modes, data collection is limited or nonexistent.

Data availability issues are manifested in five main ways. First, when all the necessary data are not provided from one source, several different sources must be combined in order to construct weights or a sampling frame. For example, the travel and tourism indexes will use data from three separate sources to calculate weights (U.S. Department of Commerce, Statistics Canada, and the Mexican Ministry of Tourism). As a result of combining data sources for sampling, weighting, or pricing, the methodology and the steps necessary to complete these processes, including software automation, become much more complex.

Second, the lack of available data sources forces us to make assumptions about the behavior of the unknown data. For example, the export travel and tourism weighting source provides data on traveler expenditures for certain broad categories: transportation, lodging, food and beverages, entertainment and recreation, and gifts, souvenirs, and other purchases. The pricing source for this index, the CPI, is able to provide data for broad categories as well as very detailed categories. IPP chose to select detailed categories that we assume best reflect purchases by foreign tourists in the U.S. For example, rather than capturing prices for all data in CPI's aggregate food and beverage category, IPP obtains

selected indexes and prices for detailed categories such as food from vending machines and mobile vendors, alcoholic beverages purchased away from home, etc. The relative importance of each individual price is obtained from CPI based on that program's surveys of U.S. residents. IPP must assume that foreign tourists actually spend money on these specific categories and that their expenditures are, at the lowest level, in the same proportion as U.S. residents.

Import travel and tourism (IT&T) provides another example of the assumptions we must make when there is not enough data available. The IT&T index will include a sample of travel agencies that will provide prices for tour packages and lodging. Ideally, the travel agency's probability of selection should be tied to its international sales of tour packages and lodging. Unfortunately, the only measure of size available from the sampling frame is employment. IPP has found that employment size is correlated to total sales of travel, but for the IT&T index we must assume that a travel agency's sales of international travel are proportional to its sales of domestic travel. This may not be an accurate assumption as the probability of selection will be under-inflated for the agencies specializing in international travel and over-inflated for the agencies specializing in domestic travel.

Third, decisions on what to include in an index are also influenced by data availability. For example, ideally, an index for export education would include expenses charged by the educational institution such as tuition and room and board as well as all other expenditures by foreign students while they are in the United States such as movie tickets, clothing, local transportation, museum entrance fees, etc. Since there are no data measuring how much foreign students spend on these other purchases, IPP includes only institutional charges, for which data are available.

Fourth, sometimes a source may provide some data on international services, but the data are not detailed enough to create a price index. For example, BEA produces data on the dollar value of trade for certain categories of exported financial services, but the data do not include the detailed information needed for weighting and sampling an export financial services index. BEA provides an overall value for exported financial management services, but does not publish data for specific categories such as the management of mutual funds, hedge funds, pension funds, trusts, or foreign commodity pools. At the lowest levels, the IPP index would be broken into these specific categories, but the necessary data do not currently exist to support an index at these detailed levels. Data on the size of these types of financial management investment vehicles and the companies that provide management services for these categories are needed in order to accurately weight items at the lowest level and to select a representative sample. In addition, prices may trend differently between these groups and detailed data are needed to accurately reflect this in the price index.

Finally, the prevalence of intra-company transactions and transfer pricing in some services areas, particularly royalties and license fees and financial services, makes obtaining an accurate price more difficult. Transfer pricing complicates data collection for goods indexes, but at least firms are required to follow guidelines set by the Internal Revenue Service (IRS) and U.S. Customs and Border Protection. For services, obtaining

a market price for intra-company transfers is even more difficult because there are fewer constraints and less scrutiny from U.S. Customs and Border Protection. This is a particularly important issue because a lot of the growth in services in recent years has been in areas where intra-company transfers are common.

#### **5.4 Difficulty in Obtaining Industry Information**

The creation of price indexes for services is further complicated by the technical nature of many services industries and the lack of specialized knowledge in these areas by the economists working on developing price indexes for these industries. Services such as financial services and royalties and license fees are broad, diverse, and difficult industries to understand. It can take several years for the analysts studying these industries to obtain the knowledge on the scope and nature of the service that is needed to create a price index. Many services are traded internally, so companies are unwilling to provide information about these intra-firm sales. Furthermore, in talking with industry insiders, IPP analysts often get conflicting information from different sources. Different companies operate in different ways and this influences their vision of the service.

Additionally, the use of secondary source data to price an index can sometimes hamper IPP's understanding of an industry. When secondary sources are used, there is usually no specific person to contact to ask questions about industry trends. The respondents for the directly collected portions of the IPP survey are often a valuable source of industry information. The lack of a specific contact person for secondary sources sometimes makes industry research and verifying the validity of price trends difficult.

#### **6. What's Next? How to Combat These Issues**

IPP is currently taking steps to address the measurement issues encountered when creating price indexes for services. A Research Steering Committee (RSC) has been established as part of the IPP management structure to manage services development research. The RSC has recently developed a strategic plan to attack these issues and to determine the next steps in creating new international price indexes for services.

For recent development projects, IPP has looked primarily at dollar values and proportion of trade to determine which services price indexes to develop. As part of the strategic plan for services development, IPP intends to conduct an upper level review of all services industries and the available data sources, and then to determine which indexes may be relatively easier to produce. For example, IPP may choose to investigate price indexes for export ocean port services and insurance because these areas may face fewer measurement issues even though the dollar value of trade for these industries may not be as large as for other industries.

The RSC also plans to investigate which price indexes would be the most use to users of IPP data, including BEA and researchers. If users indicate a strong need for price indexes for a particular service, that industry will receive a higher priority.

One measurement issue discussed earlier was the lack of detailed data from BEA to use as a source for weighting and sampling. IPP is pursuing a Memorandum of Understanding (MOU) to obtain detailed, unpublished microdata from BEA. The aim of this MOU is to obtain BEA microdata to use as sampling frames and as weighting sources for future IPP services price indexes. IPP is investigating if BEA has sufficient lower-level weights. If not, we must decide how to obtain this information.

The RSC is also looking into the scope of services indexes that IPP can and should produce. Currently, IPP services price indexes only include cross-border trade between unaffiliated trading partners. Catherine Mann, a senior fellow at the Institute for International Economics, has argued that sales through affiliates are a growing and often un-measured area of trade.<sup>12</sup> The RSC proposes to consider the various definitions of trade in services and to determine whether IPP should use a GDP and/or GNP definition for future services price indexes.

Finally, the RSC plans to review the current development process and determine where improvements can be made. Now that a few services price indexes are nearing the completion of the development process, IPP can apply these lessons to the development of future services indexes.

## **7. Summary**

By producing indexes for export travel and tourism and export education IPP would increase coverage from approximately 8 to 35 percent of exported services. Furthermore, if IPP produced an import travel and tourism index, coverage would increase from approximately 23 to 49 percent of imported services. There are many measurement issues that IPP faces when trying to develop new services price indexes such as defining the service and transaction, finding available data and obtain industry information. The Research Steering Committee is investigating these areas to resolve these issues and ultimately produce and publish more import and export services price indexes.

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<sup>12</sup> Catherine L. Mann, *Prices for International Services Transaction issues and a Framework for Development*, June 3, 2004.