U. S. Import and Export Price Indexes
OMB Control Number 1220-0025
OMB Expiration Date: May 31, 2022

SUPPORTING STATEMENT FOR
U.S. IMPORT AND EXPORT PRICE INDEXES

OMB CONTROL NO. 1220-0025

B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS

The following paragraphs summarize the primary features of the sampling and statistical methods used to collect data and produce estimates for the IPP Export and Import series. Additional technical details are provided in the BLS Handbook of Methods (https://www.bls.gov/opub/hom/ipp/pdf/ipp.pdf) and the Sampling and Index Construction Concepts papers, which are internal BLS reports and are available upon request.

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection methods to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.

The target universe of the import and export price indexes consists of all goods and services sold by U.S. residents to foreign buyers (exports) and purchased from abroad by U.S. residents (imports). However, items for which it is difficult to obtain consistent time series for comparable products (such as works of art) are excluded, as are goods purchased specifically for military use.

The import and export price indexes are calculated from prices submitted on a monthly basis by sampled establishments that agree to participate in the IPP's Import/Export Price Index survey at initiation. Thus, the IPP collects data from sampled establishments at initiation and during monthly repricing.

In the following, the unweighted quote response rates are presented for initiation and repricing.

The unweighted quote response rate and frame error rate are equal to:

$$\text{Unweighted Response Rate} = \frac{\text{COOP}}{\text{COOP} + \text{REF}}$$

$$\text{Frame Error Rate} = \frac{\text{OOB} + \text{OOS}}{\text{OOB} + \text{OOS} + \text{COOP} + \text{REF}}$$

where:

COOP = the number of cooperative quotes;
REF = the number of quotes coded as refusals;
OOS = the number of out-of-scope quotes; and
OOB = the number of out-of-business quotes

The unweighted establishment response rate and frame error rate are equal to:

$$\text{Unweighted Response Rate} = \frac{\text{COOP}}{\text{COOP} + \text{REF}}$$

$$\text{Frame Error Rate} = \frac{\text{OOB} + \text{OOS}}{\text{OOB} + \text{OOS} + \text{COOP} + \text{REF}}$$

where:

COOP = the number of establishments with at least one cooperative quote;
REF = the number of establishments with no cooperative quotes and at least one quote coded as a refusal;
OOS = the number of establishments with no quotes coded as cooperative or as refusals and with at least one quote coded as out-of-scope; and
OOB = the number of establishments with all quotes coded as out-of-business

EXPORTS

To meet the demanding requirements of the IPP in the environment of the constantly changing composition of international trade requires thoughtful statistical procedures. The universe consists of the total set of export prices. The number of establishments exporting products or services from the United States in the universe is approximately 500,000. In 2021, the overall sample for ongoing repricing of exports for the IPP is approximately 1500 exporters with 13,650 annual prices/responses. Approximately 9.1 quote prices are sampled within each exporter with a resultant average of 5.1 prices collected from each responding exporter. There are approximately 150 product category strata in the export sample design.

Export Response Rates at Initiation

This section summarizes IPP response rates at initiation for the last two export samples, at both the quote level and at the establishment level.

Table 1
Unweighted Response Rate at Quote

Level			
Outcome	**X42**	**X43**	**Overall**
Cooperative	53.0%	52.7%	52.9%
Refusal	47.0%	47.3%	47.1%

Table 1 presents unweighted quote response rates at initiation during the last two IPP export samples. Using the unweighted quote response rate formula on page 1, the overall initiation response rate for both samples (combined) is approximately 53%. Approximately 24% of the sampled quotes were either out-of-scope or out-of-business (as indicated in the following table).

Table 2

Export Quote Counts				
Outcome	**X42**	**X43**	**Overall**	**Percent**
Cooperative	3259	2922	6181	40.3%
Refusal	2893	2619	5512	36.0%
OOB	106	127	233	1.5%
OOS	1588	1806	3394	22.2%
Grand Total	7846	7474	15320	100.0%

Table 2 displays the number of quotes from the last two IPP export samples by initiation outcome code. These numbers were used to calculate the unweighted response rates at the quote level.

Table 3

Unweighted Response Rate at Establishment Level			
Outcome	**X42**	**X43**	**Overall**
Cooperative	66.2%	70.1%	68.1%
Refusal	33.8%	29.9%	31.9%

Unweighted establishment response rates at initiation are presented for the last two IPP export samples in Table 3. Using the unweighted establishment response rate formula on page 2, the overall initiation response rate for both samples (combined) is approximately 68%. Approximately 19% of the sampled units were either out-of-scope or out-of-business (as indicated in the following table).

Table 4

Export Establishment Counts				
Outcome	**X42**	**X43**	**Overall**	**Percent**
Cooperative	710	680	1390	55.1%
Refusal	362	290	652	25.9%
OOB	20	22	42	1.7%
OOS	183	253	436	17.3%
Grand Total	1275	1245	2520	100.0%

Table 4 displays the number of establishments from the last two IPP export samples by initiation outcome code. These numbers were used to calculate the unweighted response rates at the establishment level.

Export Response Rates for Repricing

Once an establishment agrees to provide price data to the IPP at initiation, each unique item to be repriced for the establishment is loaded into the repricing and estimation portions of the IPP Unified Database. In most cases an item represents a single quote from one sample, but in some cases an item represents multiple quotes from a single sample, or one or more quotes from more than one sample. IPP repricing rates are calculated based on the unique items being repriced.

The IPP continues data collection three months after data for the reference month was first published; therefore, the fourth publishing represents the final revision. Table 5 displays unweighted response rates at the time of final revision, for reference months January 2018 – December 2020.

Table 5

Export Response Rates for Repricing		
Reference Month	Response Rate	Usable Response Rate
201801	77%	75%
201802	75%	73%
201803	77%	74%
201804	74%	72%
201805	75%	73%
201806	75%	73%
201807	73%	71%
201808	74%	71%
201809	76%	74%
201810	77%	74%
201811	78%	76%
201812	77%	75%
201901	76%	74%
201902	76%	74%
201903	76%	75%
201904	78%	76%
201905	77%	75%
201906	78%	76%
201907	77%	75%
201908	76%	74%
201909	78%	76%
201910	77%	75%
201911	78%	76%

201912	76%	74%
202001	76%	74%
202002	75%	74%
202003	71%	69%
202004	73%	71%
202005	73%	70%
202006	73%	71%
202007	73%	70%
202008	74%	72%
202009	72%	70%
202010	70%	68%
202011	70%	68%
202012	70%	68%

IMPORTS

To meet the demanding requirements of the IPP in the environment of the constantly changing composition of international trade requires complex statistical procedures. The universe consists of the total set of import prices. The number of establishments importing products or services into the United States is approximately 500,000. In 2021, the overall sample for ongoing repricing of imports for the IPP is approximately 2350 importers with 20,915 prices/responses. Approximately 8.9 quote prices are sampled within each importer with a resultant average of 5.6 prices collected from each responding importer. There are approximately 150 product category strata in the import sample design.

Import Response Rates at Initiation

This section summarizes IPP response rates at initiation for the last two import samples, at both the quote level and at the establishment level.

Table 6

Unweighted Response Rate at Quote Level			
Outcome	M42	M43	Overall
Cooperative	61.2%	55.9%	58.6%
Refusal	38.8%	44.1%	41.4%

Table 6 presents unweighted quote response rates at initiation during the last two import samples. Using the unweighted quote response rate formula on page 1, the overall initiation response rate for both samples (combined) is approximately 59%. Approximately 22% of the sampled quotes were either out-of-scope or out-of-business (as indicated in the following table).

Table 7

Import Quote Counts				
Outcome	M42	M43	Overall	Percent

Cooperative	5931	5276	11207	45.9%
Refusal	3762	4166	7928	32.5%
OOB	189	180	369	1.5%
OOS	2213	2693	4906	20.1%
Grand Total	12095	12315	24410	100.0%

Table 7 displays the number of quotes from the last two IPP import samples by initiation outcome code. These numbers were used to calculate the unweighted response rates at the quote level.

Table 8

Unweighted Response Rate at Establishment Level			
Outcome	**M42**	**M43**	**Overall**
Cooperative	74.4%	70.1%	72.2%
Refusal	25.6%	29.9%	27.8%

Unweighted establishment response rates at initiation are presented for the last two IPP import samples in Table 8. Using the unweighted establishment response rate formula on page 2, the overall initiation response rate for both samples (combined) is approximately 72%. Approximately 18% of the units sampled are either out-of-scope or out-of-business (as indicated in the following table).

Table 9

Import Establishment Counts				
Outcome	**M42**	**M43**	**Overall**	**Percent**
Cooperative	1126	1057	2183	59.5%
Refusal	388	451	839	22.9%
OOB	34	30	64	1.7%
OOS	241	342	583	15.9%
Grand Total	1789	1880	3669	100.0%

Table 9 displays the number of establishments from the last two IPP import samples by initiation outcome code. These numbers were used to calculate the unweighted response rates at the establishment level.

Import Response Rates for Repricing

Once an establishment agrees to provide price data to the IPP at initiation, each unique item to be repriced for the establishment is loaded into the repricing and estimation portions of the database. In most cases, an item represents a single quote from one sample, but in some cases, an item represents multiple quotes from a single sample, or one or more quotes from more than one sample. IPP repricing rates are calculated based on the unique items being repriced.

The IPP continues data collection three months after data for the reference month was first published; therefore, the fourth publishing represents the final revision. Table 10 displays unweighted response rates at the time of final revision, for reference months January 2018 – December 2020.

Table 10

Import Response Rates for Repricing		
Reference Month	Response Rate	Usable Response Rate
201801	77%	75%
201802	77%	75%
201803	77%	75%
201804	74%	72%
201805	75%	73%
201806	75%	73%
201807	74%	72%
201808	74%	72%
201809	74%	72%
201810	75%	73%
201811	77%	75%
201812	77%	75%
201901	76%	74%
201902	76%	74%
201903	77%	74%
201904	75%	73%
201905	75%	73%
201906	76%	74%
201907	76%	74%
201908	77%	74%
201909	77%	75%
201910	75%	73%
201911	76%	74%
201912	75%	73%
202001	73%	71%
202002	74%	72%
202003	69%	68%
202004	70%	68%
202005	71%	69%
202006	72%	70%
202007	71%	69%
202008	72%	69%
202009	71%	69%
202010	69%	67%
202011	71%	69%

202012	69%	67%

2.   Describe the procedures for the collection of information including:

- **Statistical methodology for stratification and sample selection,**
- **Estimation procedure,**
- **Degree of accuracy needed for the purpose described in the justification,**
- **Unusual problems requiring specialized sampling procedures, and**
- **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

a.   Description of Sampling Methodology

The import and export merchandise sampling frames are obtained from the U.S. Census Bureau for all import transactions and for all export transactions except those to Canada. The import transactions and non-Canadian export transactions are filed on an electronic computer system known as the Automated Commercial Environment (ACE), which is maintained by the U.S. Customs and Border Protection (USCBP). USCBP transmits these transactions on a monthly basis to the U.S. Census Bureau, which edits the data for use in calculating and publishing its monthly trade indexes. The U.S. Census Bureau transmits the import and non-Canadian export transaction data monthly to the IPP upon publishing these indexes. Since exporters trading to Canada do not need to file export documentation, the IPP uses the Canadian import documents provided to the U.S. Census Bureau from the Canadian Customs Service.

The constructed import and export sampling frames contain information about all import and export transactions that were filed during the reference year. The frame information available for each transaction includes a company identifier (usually the Employer Identification Number), the detailed product category (Harmonized Tariff number) of the goods that are being shipped, and the corresponding dollar value of the shipped goods.

The IPP divides both its import and export universes into two halves referred to as panels based on trade dollar value. The program samples from one import panel and one export panel each year. Those samples are sent to the field offices for collection, so that both universes are fully re-sampled every two years. The sampled products are priced for approximately five years until the items are replaced by a newly drawn sample from the same panel. As a result, each published index is based upon the price changes of items from up to three different samples.

For exports, the two panels consist of the following major product groupings, as defined by the Harmonized System:

Export Product Panel A: Food and beverages
                            Minerals, chemicals, and rubber
                            Crude materials; related goods
                            Miscellaneous manufactures

Export Product Panel B: Machinery

Vehicles and transportation equipment

For imports, the two panels consist of the following major product groupings, as defined by the Harmonized System:

Import Product Panel A: Food and Beverages

Crude materials; related goods

Vehicles and transportation equipment

Miscellaneous manufactures

Import Product Panel B: Minerals, chemicals, and rubber

Machinery

Each panel is sampled using a three stage sample design. The first stage selects establishments independently proportional to size (dollar value) within each broad product category (stratum) identified by the Harmonized classification system (HS).

The second stage selects detailed product categories (classification groups) within each establishment using a systematic probability proportional to size (PPS) design. The measure of size is the relative dollar value adjusted to ensure adequate coverage across all classification systems, and known nonresponse factors (total company burden and frequency of trade within each classification group). Each establishment-classification group (or sampling group) can be sampled multiple times and the number of times each sampling group is selected is then referred to as the number of quotes requested.

In the third and final stage, the Field Economist, with the cooperation of the company respondent, performs the selection of the actual items for use in the IPP indexes. Using the entry level classification groups selected in the second stage, a list of items can be provided by the respondent to the Field Economist. Using a process called disaggregation, items are selected from this list with replacement to satisfy the number of quotes requested for each entry level classification group.

b.   Description of Estimation Methodology

The IPP uses the items that are initiated and repriced every month to compute its price indexes. These indexes are calculated using a modified Laspeyres index formula. The modification used by the IPP differs from the conventional Laspeyres index by using a chained index instead of a fixed-base index. Chaining involves multiplying an index (or long term ratio) by a short term ratio (STR). This is useful since the product mix available for calculating price indexes can differ over time (Bobbitt et al., 2007).

The conventional Laspeyres index and the modified index are identical as long as the market basket of items does not change over time and each item provides a usable price in every period. However, due to nonresponse and other factors, the mix of items used in the index from one period to the next is often different. The benefits of chaining over a fixed base index include a

better reflection of changing economic conditions, technological progress, and spending patterns, and a suitable means for handling items that are not traded every calculation month.

Below is the derivation of the modified fixed quantity Laspeyres formula used in the IPP.

$$LTR_t = \left(\frac{\sum p_{i,t} q_{i,0}}{\sum p_{i,0} q_{i,0}} \right)(100)$$

$$¿ \left(\frac{\sum p_{i,0} q_{i,0} \left(\frac{p_{i,t}}{p_{i,0}} \right)}{\sum p_{i,0} q_{i,0}} \right)(100)$$

$$¿ \left(\frac{\sum w_{i,0} r_{i,t}}{\sum w_{i,0}} \right)(100)$$

$$¿ \left(\frac{\sum w_{i,0} r_{i,t}}{\sum w_{i,0} r_{i,t-1}} \right) \left(\frac{\sum w_{i,0} r_{i,t-1}}{\sum w_{i,0}} \right)(100)$$

$$¿ \left(\frac{\sum w_{i,0} r_{i,t}}{\sum w_{i,0} r_{i,t-1}} \right)(LTR_{t-1})$$

$$¿ (STR_t)(LTR_{t-1})$$

where:

$p_{i,t} =$ price of item i at time t

$q_{i,o} =$ quantity of item i in base period 0

$w_{i,0} = p_{i,0} q_{i,0}$ the total revenue in base period 0

$r_{i,t} = \dfrac{p_{i,t}}{p_{i,0}}$, or the long term relative of item i at time t

$LTR_t =$ long-term ratio of a collection of items at time t

$STR_t = \left(\dfrac{\sum w_{i,0} r_{i,t}}{\sum w_{i,0} r_{i,t-1}} \right)$

For each classification system, the IPP calculates its estimates of price change using an index aggregation structure (i.e. aggregation tree) with the following form (Powers et al., 2006):

Upper Level Strata
Lower Level Strata
Classification Groups (CGs)
Weight Groups (i.e. Company-Index Classification Group)
Items

A stratum may have several middle-level-strata or none, between itself and the classification group level. The number of middle-level-strata from the classification group to each stratum varies depending on which stratum the specific CG belongs. Similarly, the number of middle-

step-strata from a stratum lower to an overall index varies. The following general formula is used until the desired aggregation level index is obtained.

Let *Child*[*h*] to be the set of all strata or classification groups in the aggregation level directly below Stratum *h* in an aggregation tree. Let $STR_{h,t}$ be a short-term ratio of stratum, h , at time t :

$$STR_{h,t} = \frac{\sum_c w_c LTR_{c,t}}{\sum_c w_c LTR_{c,t-1}}$$

where:

$c \in stratum[h];$
w_c = weight of child c;
LTR_t = long-term ratio of child c at time t.

As mentioned previously, at any given time, the IPP has up to three samples of items being used to calculate each stratum's index estimate. Currently the IPP combines the data from these samples by 'pooling' the individual estimates.

Pooling refers to combining items from multiple samples at the lowest level of the index aggregation tree. These combined sample groups are referred to as a weight group. Different sampling groups can be selected for the same weight group across different samples, so it is possible that multiple items from different sampling groups can be used to calculate a single weight group index. This weight group level aggregation is done primarily so the Industry Analysts within IPP can perform analyses on the index information across samples.

3. **Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.**

Adequate sample sizes for estimating IPP indexes are critical for mitigating non-response (which includes out-of-business, out-of-scope, and refusal outcomes); as such, IPP employs several techniques to ensure that initial sample sizes are sufficiently larger than desired sample sizes. The methodology changes detailed below resulted from an analysis of initiation attempts for export and import samples. (For additional details, see the Out-of-Scope Export and Import Analysis reports which are internal BLS reports available upon request.)

> o A paneling approach was implemented whereby a new sample is introduced each
> year across half the product categories, re-establishing the distribution of the
> sample and incorporating changes in the distribution of exports/imports.
> Frequency of trade of exporters/importers in products is measured from the
> sampling frame and incorporated in the sample design to reduce the

out-of-scope rate.

- o For exports, the IPP receives name and address information for each export shipment from a company and has revised its matching process for determining the correct name and address of each sampled unit.

- o The Program has implemented linking the Employer Identification Number (EIN) to additional data sources and using the linked information for identifying the correct name, address, and other pertinent information of each sampled unit.

- o Additionally, other variables on the sampling frame were examined for aid in identifying out-of-scope trade. As a result of this analysis, the IPP now screens (from its sampling frame) transactions that contain values for these variables that identify out-of-scope shipments.

- o In 2011, the IPP began a pilot study to examine the productivity of allowing initiation of a sampled product area to occur at a broader (six-digit Harmonized) level when the original initiation at the more detailed ten-digit Harmonized level resulted in an out-of-scope situation. Following the implementation of these changes into production (in 2012), the IPP observed a decline in out-of-scope rates at both the quote level and at the establishment level.

To improve the response rate of respondents, the IPP has devised strategies to reduce respondent burden while increasing or at least maintaining their level of participation. The strategies which the IPP has implemented include the following:

- o capping the burden for a respondent within a sample;

- o enhancing the sampling refinement process so that Field Economists can prioritize items for collection if burden issues arise (with input from the National Office, if applicable); and

- o repricing current items for a longer period of time rather than initiating new items.

IPP has implemented additional changes over the years to further reduce burden for companies which are major traders and account for a significant portion of international trade. These changes include enhancements to IPP's sampling and initiation processes that help to ensure that the Program adheres to companies' requests about the timing of (initiation) visits, attempts simultaneous collection of both IPP & PPI data (if applicable), and lowers the selection probability of an infrequently traded Sampling Classification Group (SCG). (SCGs which are frequently traded are generally easier for respondents to identify during initiation.)

Most recently, IPP modified procedures related to potential current hits (PCHs) in an effort to reduce burden on respondents who currently report prices to the IPP. Previously, the procedures required Field Economists to attempt to disaggregate for each sampled quote regardless of the existence of a PCH and only select a current hit if the disaggregation lead to the same item that is currently in repricing. With the revised procedures, Field Economists are instructed to inform

the respondent that the IPP will reselect the item(s) in repricing for the requested quote(s) where applicable and obtain a more updated version if it exists.

Also of late, IPP implemented minor changes to the wording in the 'notification to reprice' and email reminder for web respondents. A section was added to the 'notification to reprice' that asks respondents to select 'not traded' or to replace items, as appropriate. This is an attempt to ensure that IPP continues to obtain response from respondents who may not be trading under current business conditions. In the email reminder, improved wording lets respondents know that they can change contact information directly in the web survey or by replying to the email reminder.

IPP has begun capturing information supplied from Field Economists for non-productive schedules to currently active respondents to assist with non-response and retention efforts.

4. **Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.**

The Program has implemented several changes to reduce respondent burden (discussed under number 3 in parts A and B of the Supporting Statement). However, the IPP has no testing related to reducing respondent burden scheduled for the foreseeable future.

5. **Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.**

The responsibility for the statistical aspects of the International Price Program as well as collection and processing of price information, resides with Susan Fleck, Assistant Commissioner for International Prices, Office of Prices and Living Conditions, Bureau of Labor Statistics.

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