

## **Explanation of Sample Prices**

### **A. Scope of the Survey**

In principle, the price survey is conducted on (1) companies that manufacture products comprising selected commodities and wholesalers that engage in import or export transactions. However, for some commodities, (2) data obtained from statistics compiled by other organizations and third-party databases (hereinafter called "alternative data") are used in order to improve the index accuracy and reduce the respondent burden.

### **B. Survey Items**

As Figure 1 shows, the Bank of Japan acquires information from the respondents (including alternative data; the same applies hereinafter), not only on the prices of the products, but also on characteristics (quality) that may affect the prices, including the following: (1) the details of the surveyed products; (2) the contract currency; (3) inclusion or exclusion of consumption tax; (4) the pricing method; (5) the point in time when the price is recorded; (6) customers; (7) the stage of the supply chain; (8) the terms of delivery; (9) the contract period; (10) the product usage; and (11) the transaction size. Of these, information on (1) through (8) is essential, whereas that on (9) through (11) is required only if it affects the prices. The information on the prices and all of these characteristics is collectively referred to as "sample prices."

The Corporate Goods Price Index (CGPI) continuously surveys the prices of products with constant quality and indexes those prices. Therefore, the Bank conducts price surveys by fixing (specifying) each item of the abovementioned characteristics (quality).

Figure 1: Information Acquired in the Price Survey: Details of Sample Prices

Survey items		Details
Price of the surveyed product		Price
Characteristics of the price	(1) Product	Material, performance, grade, model (product number), quantity (units, tons), etc.
	(2) Currency	Yen, U.S. dollar, euro, etc.
	(3) Consumption tax	Including consumption tax, excluding consumption tax, or tax-free
	(4) Pricing method	Specification pricing, average prices, model pricing, list prices, etc.
	(5) Point in time when the price is recorded	Time of shipment or contract, time of cargo loading or unloading, etc.
	(6) Customers	Customers (wholesalers, retailers, end users, agencies, local subsidiaries, etc.), and export destinations (the United States, China, Europe, etc.)
	(7) Stage of supply chain	Producer stage, customs clearance stage, wholesale stage, etc.
	(8) Terms of delivery/International commercial terms	Ex Works (EXW) or Delivered Free, Free on Board (FOB) or Cost, Insurance, and Freight (CIF), etc.
	(9) Contract period	Long-term contract, spot contract, etc.
	(10) Product usage	For construction or for automobiles, for business or for households, etc.
	(11) Size of transaction	Large-lot transactions, small-lot transactions, etc.

### C. Selection of Sample Prices (Surveyed Products and Respondents)

In recent years, products have become more high-value-added and more varied, increasing occasions of price discrimination among customers. Under this situation, even within the same commodity classification, price trends differ due to variety in characteristics, such as producers, products, usage, and customers.

In selecting the sample prices for each commodity in the CGPI, the Bank identifies the characteristics, which affect the price trends, such as producers, products, usage, and customers. Then, in terms of each of these characteristics, the Bank adjusts the composition of sample prices based on the actual composition of the market, in order to improve index accuracy. Moreover, if necessary, the Bank reviews the composition of sample prices, besides the timing of rebasing every five years. Specifically, the Bank selects sample prices based on the following seven-step process.

- (1) Identifying the features of products, producers, and markets for each commodity.**
- (2) Deciding on the number of sample prices for each commodity.**
- (3) Selecting characteristics (product type, usage, producers, etc.) that affect the price trends.**
- (4) Identifying the actual composition of each characteristic within the commodity.**
- (5) Allocating the sample prices within the commodity: deciding on the number of sample prices for each category of characteristics.**
- (6) Selecting the candidate companies to request the price survey.**
- (7) Requesting companies for cooperation on the price survey.**

### **C-1. Identifying the features of products, producers, and markets for each commodity**

The Bank identifies the features of products, producers, markets, etc. for each commodity by collecting information from various statistics, trade journals, books, company websites, etc., and holding interviews with companies and industrial associations as necessary. In particular, the Bank places emphasis on identifying factors including the extent of variation in the price trends of products, and the diversity of products that cause the variation in the price trends, as well as whether price discrimination exists for such products.

### **C-2. Deciding on the number of sample prices for each commodity**

From the viewpoint of reducing the respondent burden, the CGPI flexibly sets the number of sample prices for each commodity by considering the price trends and the transaction values of the commodity, so as to secure high-index accuracy with a small number of sample prices. Specifically, for a commodity with little variation in price trends, such as where each product within the commodity is fairly homogeneous and the price trends are linked with commodity product prices, the Bank limits the number of sample prices to about three, which is the minimum number of prices required to compile the index.<sup>1</sup> On the other hand, for a commodity with large variation in price trends, such as where the products are diverse and notable price discrimination

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<sup>1</sup> In the CGPI, the Bank acquires information on at least three sample prices from multiple respondents for each commodity, in order to keep the individual information of the respondents confidential. In the case of a commodity for which alternative data are used, the Bank sometimes sets the number of sample prices at one or two, because there is no need to keep the information confidential.

exists, the Bank increases the number of sample prices to about 50, as necessary.<sup>2</sup>

### **C-3. Selecting characteristics that affect the price trends**

In order to improve the index accuracy without excessively increasing the total number of sample prices, it is necessary to select the sample prices for each commodity effectively. In the CGPI, for each commodity, the Bank selects two characteristics that have the largest effect on variation in the price trends and creates a composition matrix using those characteristics. Composition of sample prices is decided to match the matrix (see Figure 2).<sup>3</sup> The Bank has, in general, selected "product type," "producers," "usage," "customers (export destinations)," and "contract period (long-term contracts or spot contracts)" as the characteristics.

### **C-4. Identifying the actual composition of each characteristic within the commodity**

Within the commodity, the Bank identifies the composition of each characteristic selected above in Section C-3. For identifying the composition of "product type" and "producers," the Bank uses materials such as the *Census of Manufacture* and the *Current Survey of Production* of the Ministry of Economy, Trade and Industry (METI), various statistics compiled by industrial associations, and information on market shares released by private research institutes. For "usage," materials such as the *Input-Output Tables*, and for "export destinations," the *Trade Statistics of Japan* of the Ministry of Finance (MOF) are used. However, it is often the case that the detailed information needed for the identification cannot be obtained from statistics and data. In such cases, the Bank holds interviews with companies and industrial associations to grasp the approximate composition of each characteristic.

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<sup>2</sup> Commodities with a large number of sample prices are the following: the Producer Price Index (PPI) "Steelworks," "Mold, die & parts," "Bolts & nuts," and "Drive, transmission & steering parts"; the Export Price Index (EPI) "Standard passenger cars (gasoline cars)"; and the Import Price Index (IPI) "Sweaters" and "Women's or girls' skirts, etc."

<sup>3</sup> The number of characteristics that affect variation in price trends is not necessarily two, but by increasing the number of characteristics to be considered in selecting the sample prices, the required number of sample prices will increase exponentially (e.g., if the Bank sets  $m$  sample prices for each of  $n$  characteristics,  $m^n$  prices are needed). Accordingly, the Bank generally considers two characteristics.

#### **C-5. Allocating the sample prices within the commodity: deciding on the number of sample prices for each category of characteristics**

The Bank decides on the number of sample prices to be allocated for each category of characteristics to match the actual composition within the commodity, identified above in Section C-4. Specifically, the composition of sample prices is decided to match the composition matrix of the two characteristics, as shown in Figure 2.

#### **C-6. Selecting the candidate companies to request the price survey**

To match the composition of sample prices decided above in Section C-5, the Bank lists the companies as candidates for the price survey in the order of market shares in terms of the production or shipment value for each category of the two characteristics. In this process, the Bank uses the raw data of official statistics, such as the *Census of Manufacture*, and information on market shares released by private research institutes. However, data on the market shares for each of the categories (e.g., granular data on market shares by product type, by usage, and by customers) often cannot be obtained. Therefore, the Bank holds interviews with companies to ask them about the details of their production or shipment to grasp their approximate market shares for each of the categories, along with requesting their cooperation on the price survey.

#### **C-7. Requesting companies for cooperation on the price survey**

One at a time, the Bank requests the companies listed as candidates in Section C-6 for cooperation on the price survey. This is repeated until the number of sample prices meets the required level. The procedure is explained in detail in the following Section D. "Flow of Request for Price Survey: How the Price Survey is Commenced."

Figure 2: Example of the Selection for the Sample Prices in Each Commodity

**Product characteristics**

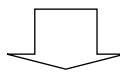
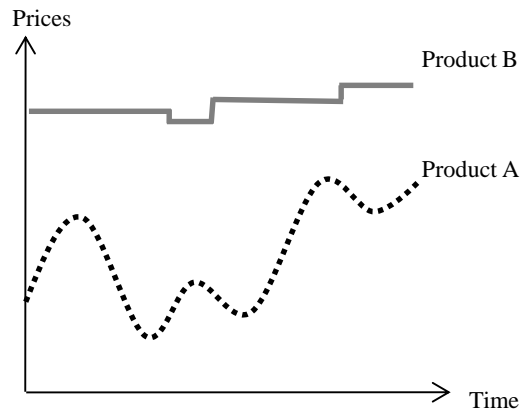
Product type A:

Since the products are low-value-added, their prices are highly affected by price developments in raw materials.

Product type B:

Since the products are high-value-added, their prices are little affected by price developments in raw materials.

**Price trends**



**Selection method**

- (a) Since there is large variation in the price trends by product type and by usage, "product" and "usage" are selected as the two price-determining characteristics for selecting sample prices (vertical axis: product; horizontal axis: usage).
- (b) Given the number of sample prices for the commodity, the numbers of sample prices by product and by usage is decided to match the characteristics composition in the matrix shown below.
- (c) Category "Other products" shows no difference in the price trends by usage, so it is not classified by usage.

**Results of selection of sample prices**

Product type A Usage  $\alpha$ : 3 prices; Usage  $\beta$ : 2 prices; Usage  $\gamma$ : 1 price; Other Usage: 1 price

Product type B Usage  $\alpha$ : 2 prices; Usage  $\beta$ : 1 price

Other products Usage not specified: 1 price

		Share of transaction value by usage						
		Usage $\alpha$ (40 percent)			Usage $\beta$ (30 percent)		Usage $\gamma$ (10 percent)	Other usage (20 percent)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of transaction value by product	Product type A (55 percent)							
	Product type B (35 percent)	(8)	(9)		(10)			
Other products (10 percent)		(11)						

Note: (1)-(11) are sample prices.

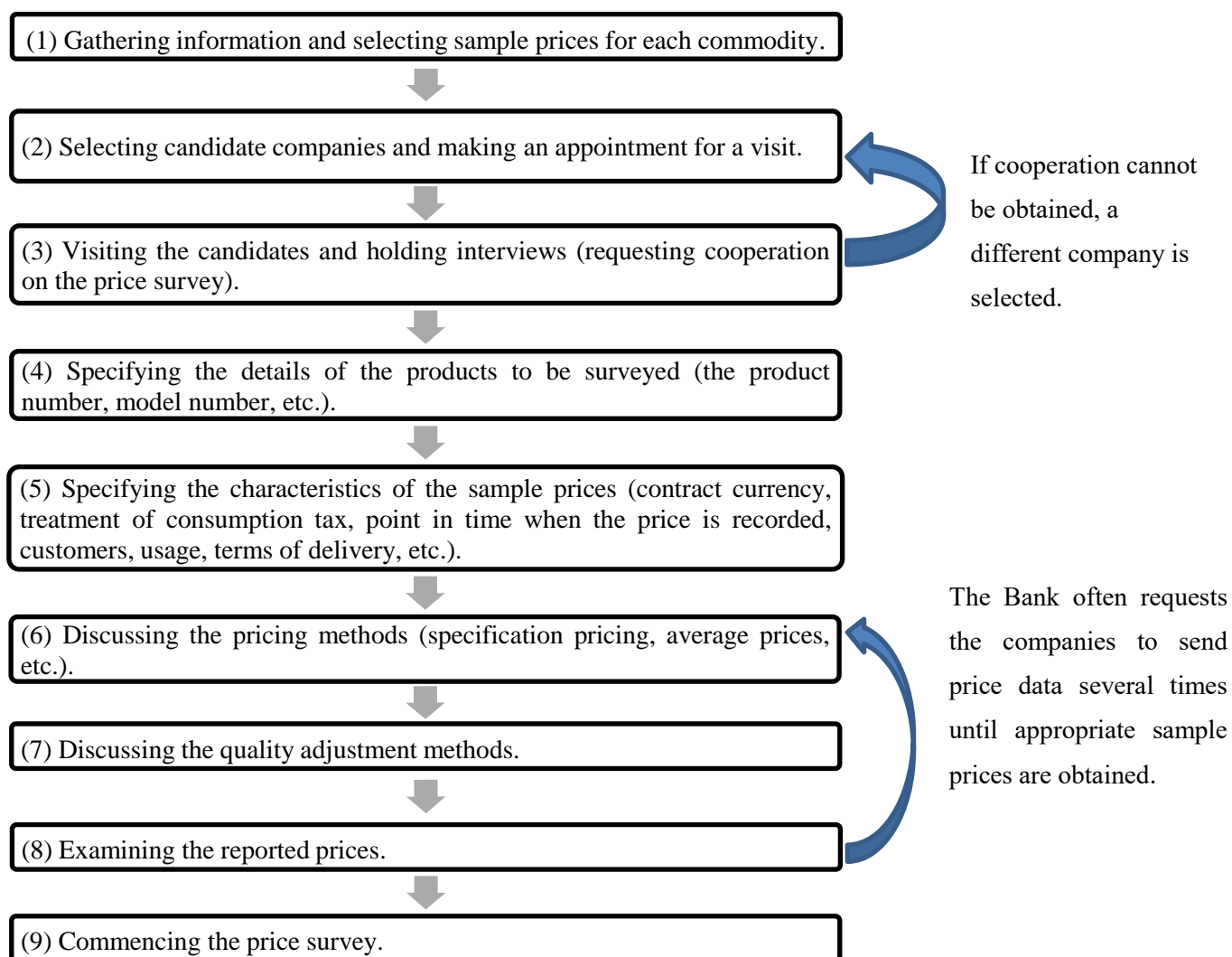
#### **D. Flow of Request for Price Survey: How the Price Survey is Commenced**

Since the CGPI price survey is complicated, it is difficult to conduct the survey smoothly without holding discussions between the Bank and the selected candidates prior to the commencement of the survey.

Accordingly, before conducting the survey, the Bank visits the individual candidates to request their cooperation on the survey. The Bank selects the product to be surveyed from those that meet the conditions described in Section C. "Selection of Sample Prices": a best-selling product with a large transaction volume, which represents the price trends of the category in the composition matrix of the two characteristics to which the product belongs. Then the Bank specifies the details of the product (the material, performance, grade, product number, model, etc.) and other characteristics of the sample price (the contract currency, treatment of consumption tax, the point in time when the price is recorded, customers, terms of delivery, etc.). Moreover, the Bank discusses the price survey method as well as the quality adjustment method with the respondents, in order to achieve results that are as highly accurate as possible.

The Bank considers a price survey method that secures high index accuracy and less respondent burden, given that the companies do not necessarily manage all of their transaction data (sometimes the Bank requests the companies for trial calculations of the price by multiple methods). Therefore, it may take several months from the initial approach until the survey actually commences (Figure 3).

Figure 3: Flow of Request for Price Survey



### E. Varieties of Sample Prices (Pricing Methods)

When conducting the price survey, the Bank adopts the following pricing methods according to the features of both the products to be surveyed and the transactions: (1) the specification pricing method; (2) the average price method; (3) the model pricing method; or (4) the list price method (Figure 4).

A best-selling product with a large transaction volume, which represents the price trends of each product category, is selected as the product to be surveyed. When surveying the prices, it is necessary to reflect only the pure price changes in the price index, and not the price fluctuations caused by changes in the quality of the products. Therefore, in principle, the Bank fixes (specifies) the characteristics that determine the quality (the details of the product, contract currency, customers of the product, usage, terms of delivery/international commercial terms, etc.) according



to necessity, and surveys the actual transaction prices. This is referred to as (1) the specification pricing method (direct use of prices of repeated transactions). If, however, it is difficult to conduct a continuous survey of pricing with constant quality, (2) the average price method (unit value method) or (3) the model pricing method is adopted. In such case, some quality-fixing conditions are reduced to the extent where the constant quality of the product is generally guaranteed. Furthermore, if a price survey cannot be conducted by any of the above methods (1) to (3), then (4) the list price method or other methods are adopted.

Figure 4: Major Pricing Methods

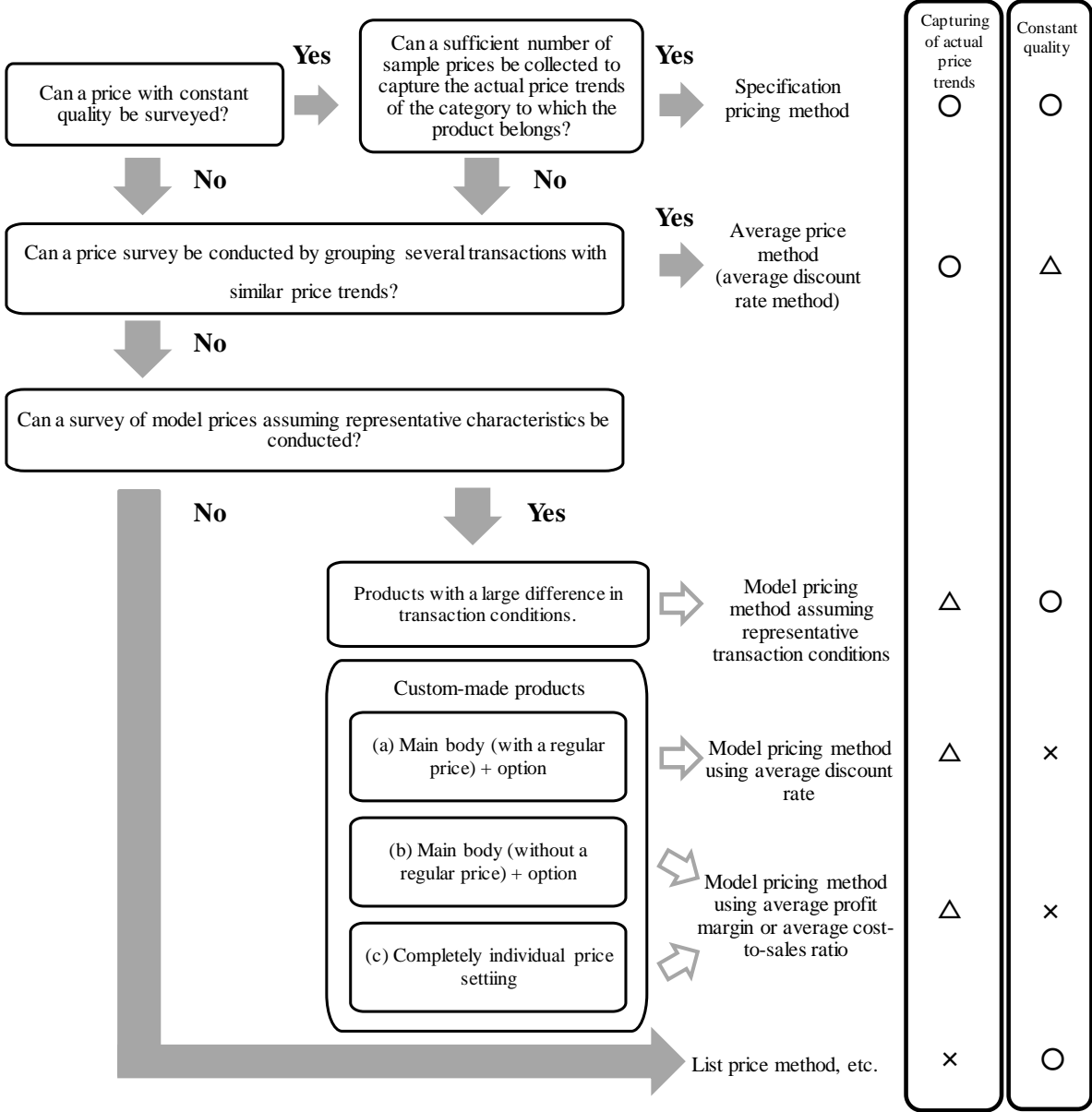
Pricing method	Explanation
<b>Specification pricing method (Direct use of prices of repeated transactions)</b>	- Actual transaction prices with characteristics that determine the quality (the details of the product, contract currency, customers, usage, terms of delivery/international commercial terms, etc.) are fixed.
<b>Average price method (Unit value method)</b>	- Average price at which multiple transactions of similar products or with different customers, etc. are grouped, to the extent that the condition of constant quality is guaranteed. - Average price derived from the "average discount rate" for the class of similar products and the "regular price" of the representative product in the class, i.e., the regular price multiplied by (1 – average discount rate).
<b>Model pricing method</b>	<b>Model pricing method assuming representative transaction conditions</b> - Prices estimated by assuming continuous transactions with representative transaction conditions.
	<b>Model pricing method using average discount rate</b> - Prices derived from the "average discount rate" for the class of similar products and the "regular prices" estimated by assuming continuous transactions of the representative product in the class.
	<b>Model pricing method using average profit margin or average cost-to-sales ratio</b> - Prices derived from the "average profit margin" or the "average cost-to-sales ratio" for the class of similar products and the "manufacturing cost" estimated by assuming continuous transactions with the representative product in the class.
<b>List price method</b>	- Prices used as standard prices in actual transactions of specific products (e.g., quoted price or invoice price, regular price × standard discount rate, and catalogue price).

The Bank decides on the pricing method according to Figure 5 "Flowchart for Selecting Pricing Method" by taking into consideration the characteristics and price trends of the products to be surveyed and the availability of data at respondents. The four pricing methods described above have different advantages and disadvantages in terms of the capability of capturing the actual

price trends and the degree of constant quality. The Bank holds repeated discussions with respondents by considering these points, and decides on an appropriate pricing method.

The Bank regularly follows up on the details of sample prices, and changes the pricing method if necessary.

Figure 5: Flowchart of Selecting Pricing Method



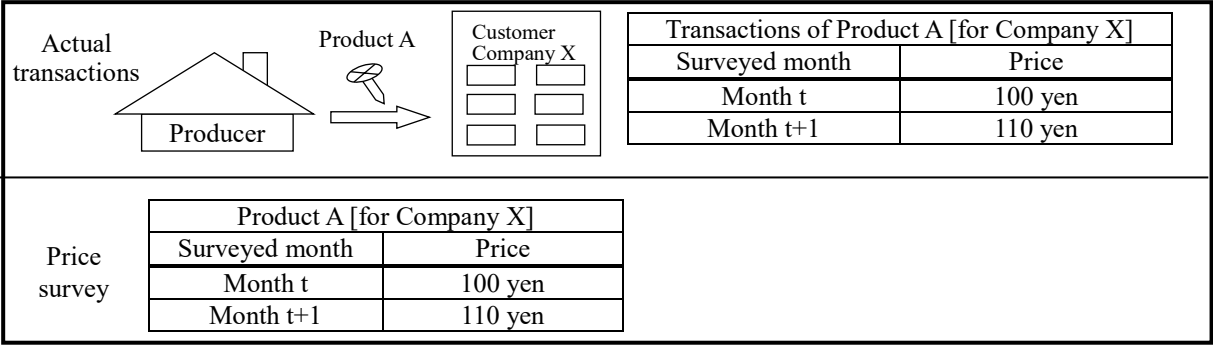
Note: The Bank considers adoption of the "average discount rate method" when the price trends are similar but there is a large difference in price levels due to difference in quality in each sample price.

**E-1. Specification pricing method (direct use of prices of repeated transactions)**

It is appropriate to adopt the specification pricing method if the following conditions are fulfilled:

there is a best-selling product with a large transaction volume that represents the price trends of each product category and a price survey can be conducted with fixed characteristics that determine the quality (the details of the product, contract currency, customers, usage, terms of delivery, etc.). The specification pricing method is highly capable of fixing the quality of sample prices and is the most desirable price survey method for compiling a price index with constant quality (Figure 6).

Figure 6: Specification Pricing Method



**(a) Status of adopting the method in price surveys**

In the CGPI, the Bank prioritizes the specification pricing method over other pricing methods. Price surveys conducted by the specification pricing method account for 50 percent of the sample prices in the Producer Price Index (PPI), 80 percent in the Export Price Index (EPI), and 82 percent in the Import Price Index (IPI), accounting for 60 percent of the three price indexes in total (Figure 7).

Figure 7: Composition Ratios of Pricing Method

percent

	Specification pricing method	Average price method	Model pricing method		List price method	Other surveys	Data from alternative sources
			Average profit margin or average cost-to-sales ratio	Other model pricing methods			
PPI	49.6	23.2	2.4	2.8	2.9	2.6	16.6
EPI	79.6	11.3	1.7	0.8	1.0	0.5	5.1
IPI	82.4	11.4	0.0	0.0	1.0	1.5	3.7
Sum of three price indexes	60.1	19.3	1.9	2.0	2.2	2.1	12.5

Note: As of October 2016, based on the number of sample prices.

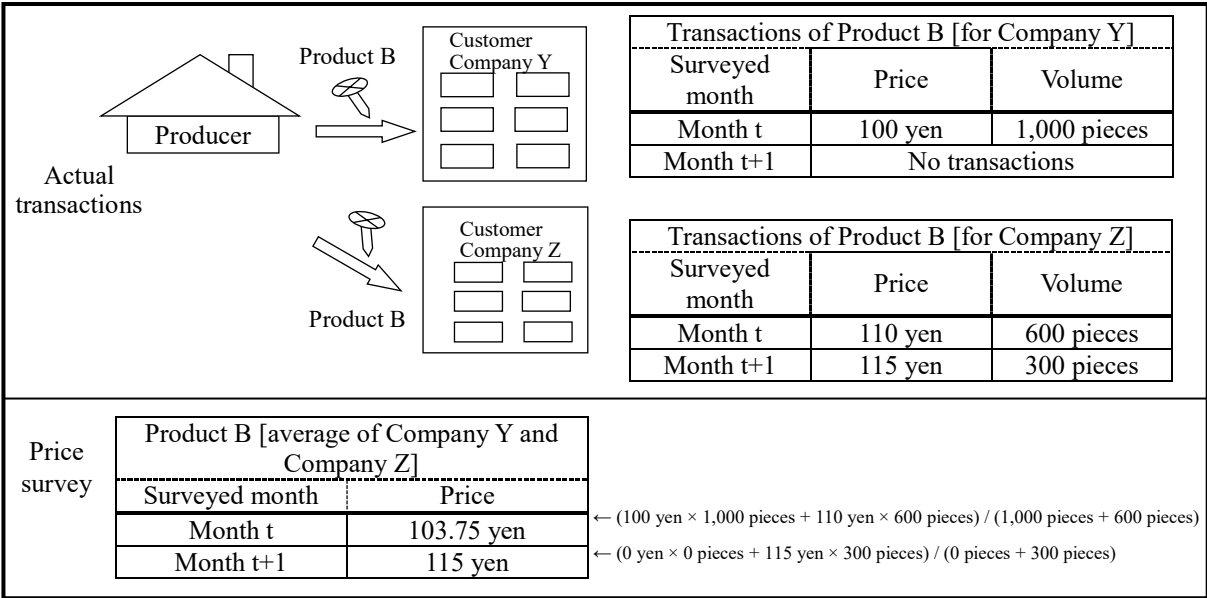
### E-2. Average price method (unit value method)

However, there are cases where it is difficult to create a highly accurate price index through the specification pricing method. For example, (1) when there is a large variation in the price trends in the category of products to be surveyed due to differences in the details of the products, customers, usage, etc., a considerably large number of sample prices will be required in order to secure high index accuracy. However, in this case, it is difficult to secure a sufficient number of sample prices in light of the respondent burden. In addition, (2) when the products are produced in large varieties and in small volumes, or traded with a large number of customers in small-lot transactions, there will be a long interval between each transaction of the product if the Bank specifies details of product type or a customer as a characteristic of the price to be surveyed. In such case, sample prices using the specification pricing method may not properly reflect the actual price trends, and therefore price indexes with high accuracy will not be compiled.

In these cases, the Bank reduces some quality-fixing conditions to the extent as far as the condition of constant quality of the price is generally guaranteed. Then, several transactions with small differences in the price levels and price trends caused by the varieties in quality (the details of the product, customer, etc.) are grouped to the extent possible. The average price is calculated by adding up the nominal sales of individual transactions which is then divided by the total sales (shipment) volume of the transactions in the category (this is referred to as the average price method; Figure 8).

Since the average price method can cover a large number of transactions with a small number of sample prices, it can secure sufficient transaction coverage within the commodity and improve the index accuracy without posing excessive respondent burden (response to case [1] above). Moreover, this method enables the Bank to conduct a price survey and compile a price index that reflects the actual price trends even when repeated transactions with the same customers are not maintained, such as in the case of spot transactions (response to case [2] above). On the other hand, the average price method has a disadvantage in that the index may fluctuate due to changes in the mix of the quality characteristics in an individual sample price.

Figure 8: Average Price Method



**(a) Status of adopting the method in price surveys**

In the CGPI, the average price method is widely adopted in light of the advantages and disadvantages mentioned above. The average price method is adopted for 23 percent of the sample prices in the PPI, 11 percent in the EPI, and 11 percent in the IPI, which accounts for 19 percent of the three price indexes in total (Figure 7). Looking at the adoption rate of the average price method by group, in the PPI, the rate is highest for the group "Beverages & foods" at 58 percent, followed by "Metal products" and "Pulp, paper & related products" at slightly less than 40 percent, and "Textile products," "General purpose machinery," "Production machinery," "Business oriented machinery," and "Electrical machinery & equipment" at over 30 percent. As in the case of the group "Beverages & foods," the average price method is effective in capturing the actual price trends particularly of commodities for which there is notable price discrimination between customers due to the companies' pricing strategy.

### **(b) Average discount rate method as a type of average price method**

In the average discount rate method, the Bank specifies the product class and selects a product with a large transaction volume in the class. Then, the "regular price" of the product and the "average discount rate" of the product class (the weighted average of the discount rate on the regular prices of the products) are surveyed. The sample price is calculated by combining these two using the formula "regular price  $\times$  (1 – average discount rate)." When the levels of prices differ largely by quality, while the price trends are similar, price surveys can be conducted efficiently using the average discount rate of the product class. The average discount rate method is adopted for commodities such as "Chassis & body parts" and "Forklift trucks & parts" under the group "Transportation equipment," and the commodity "Precision measuring instruments" under the group "Business oriented machinery."

### **E-3. Model pricing method**

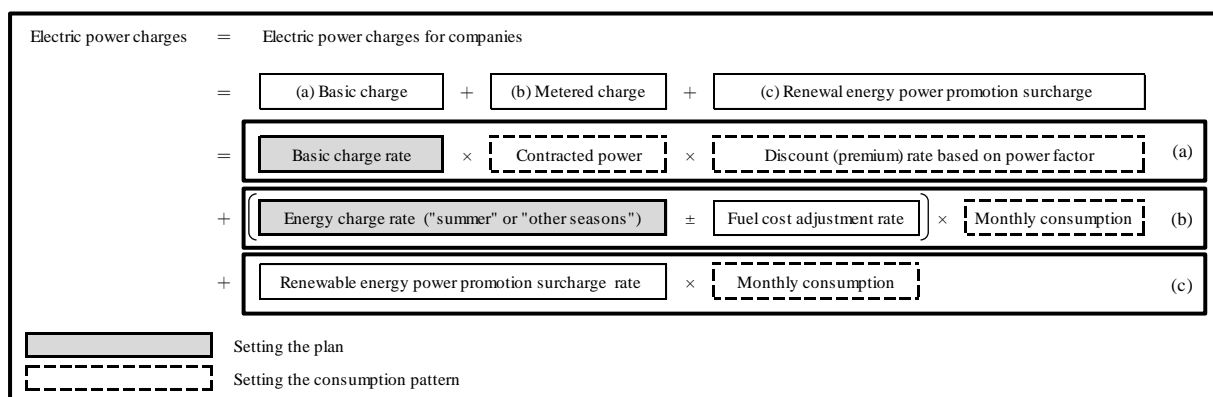
The Bank adopts the model pricing method if adopting both the specification pricing method and the average price method are difficult and assuming transactions with representative characteristics is possible.

#### **E-3-1. Products with prices that differ largely by transaction condition (charge plan and/or amount of usage)**

When the transaction conditions of the products are complicated, differences in the transaction conditions may cause a large variation in the price, despite transactions of the same product or with the same customers are continuously carried out. Neither the specification pricing method nor the average price method is applicable in such case. However, in some cases, sample prices can be computed by assuming representative transaction conditions. In such case, the model pricing method assuming representative transaction conditions is adopted. This method is widely adopted for the group "Electric power, gas & water." As shown in Figure 9, the model price can be calculated by selecting a charge plan and setting the consumption pattern, i.e. the amount of usage.

The model pricing method assuming representative transaction conditions has an advantage in that, once representative transaction conditions are set, price surveys with constant quality characteristics can be conducted. On the other hand, if the transaction conditions are set inappropriately and the assumed transactions in the model deviate from actual ones, the model may not sufficiently capture the actual price trends.

Figure 9: Model Pricing Method Assuming Representative Transaction Conditions



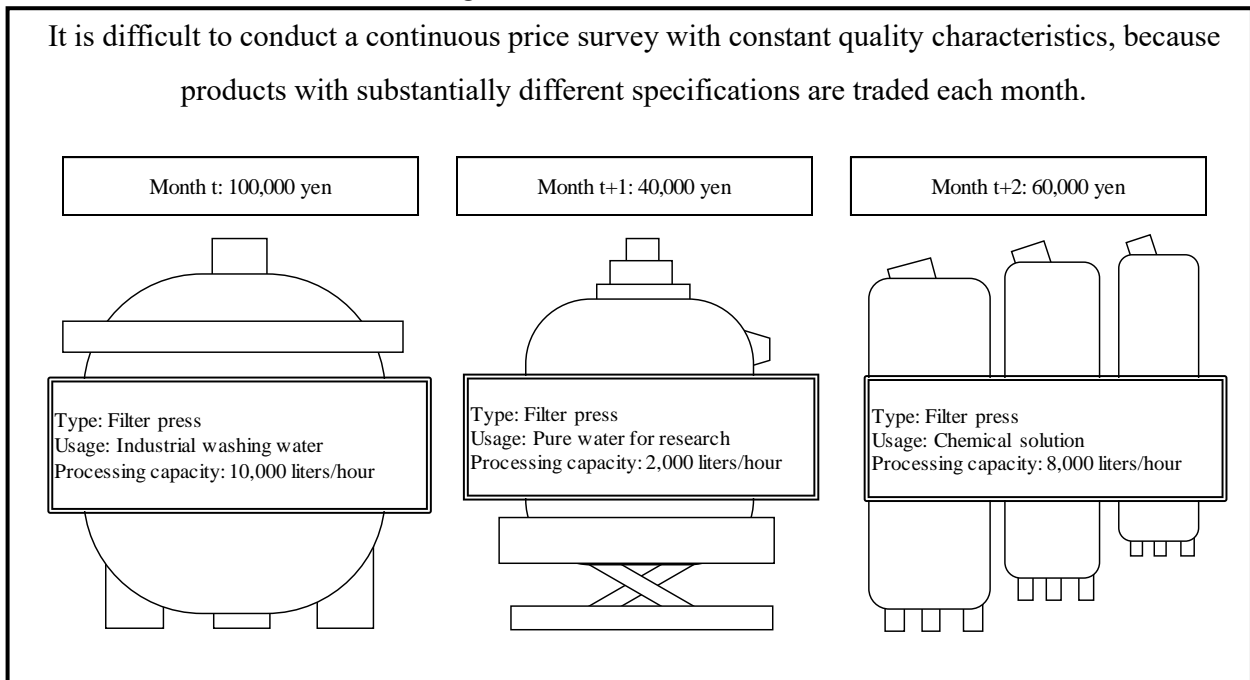
### E-3-2. Custom-made products

Custom-made products, which are produced according to customer needs, are not traded continuously, and a product once-provided is not necessarily provided repeatedly (not even twice in some cases). This is because, for example, the characteristics (quality) of the products differ for each shipment. Such products have increased as Japanese industrial products have become increasingly high value-added (Figure 10).

For custom-made products, it is impossible to survey pricing with constant quality by using the specification pricing method or the average price method, since both methods are adopted for the same products or classes of similar products. In such cases, the model pricing method using the average discount rate or an average profit margin (or average cost-to-sales ratio) is adopted as an alternative price survey method. These methods assume continuous transactions of the representative product in the class. The sample price is calculated by multiplying the price of the representative product by the actual average discount rate of the class, or by the actual average profit margin (or the average cost-to-sales ratio) of the class.

The model pricing method using the average discount rate and the model pricing method using an average profit margin (or average cost-to-sales ratio) calculate the price by using the data of all transactions of the product class. These methods have the advantage of being able to capture the price trends of the product class. However, if the hypothetical product model is set inappropriately and deviates from actual transactions, it may not sufficiently capture the actual price trend of the product class. Furthermore, as the average discount rate, the average profit margin, and the average cost-to-sales ratio are calculated from the data of all transactions in the product class, they could be affected by changes in the mix of quality characteristics in the class; therefore, irregular index fluctuations must be tolerated.

Figure 10: Custom-Made Products



When setting the model pricing method for hypothetical custom-made products, the prices are categorized into the following three types:

- (1) Regular price of the main body that is common to all products + price of the option**
- (2) Individual price of a main body that is not common to all products + price of the option**
- (3) Completely individual pricing due to not being able to separate the product into the main body and option**

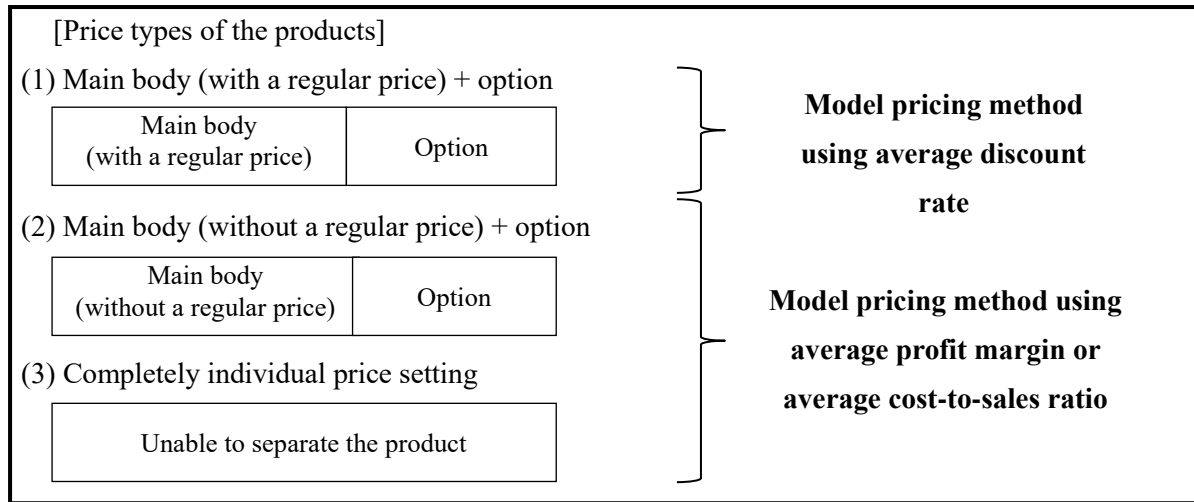
Then, the following model pricing methods are adopted in the respective cases, in principle (Figure 11):

**In the case of (1), the model pricing method using the average discount rate is adopted.**

**In the case of (2) or (3), the model pricing method using an average profit margin or average cost-to-sales ratio is adopted.**



Figure 11: Selection of the Model Pricing Method for Custom-Made Products



### E-3-2-1. Model pricing method using average discount rate

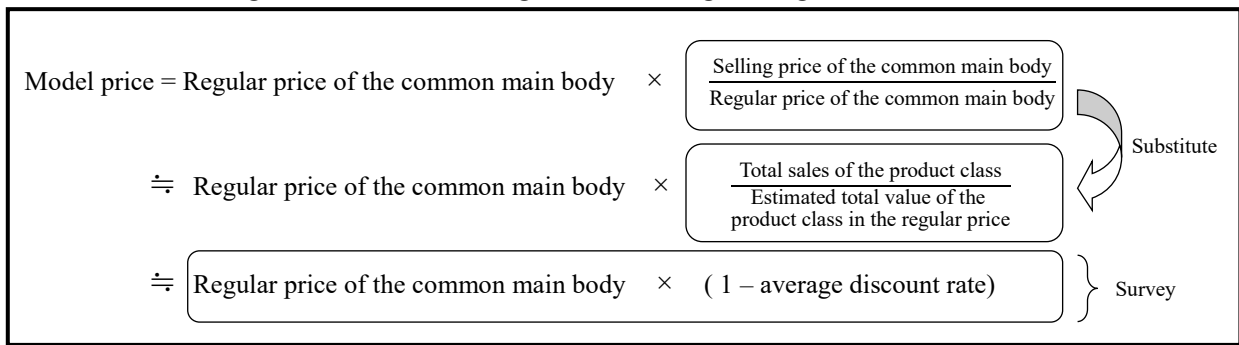
When adopting the model pricing method using the average discount rate, the following information is collected from the respondents: (1) the regular price of a hypothetical main body that is common to all products and (2) the average discount rate of the product class (the actual discount rate for custom-made products manufactured based on customer needs, which is the weighted average of all transaction data in the class, calculated by using the regular price of the common main body and the option). Then, the values of (1) and (2) are multiplied together to obtain the sample price for the case where a common main body is continuously traded.

#### (a) Status of adopting the method in price surveys

The model pricing method using the average discount rate is adopted for the group "Production machinery" (the commodities "Agricultural tractors & power tillers," "Construction cranes," etc.) in the PPI and the group "General purpose, production & business oriented machinery" (the commodity "Machining centers," etc.) in the EPI, in which many products are highly customized (Figure 12).<sup>4</sup>

<sup>4</sup> In some cases of type (3) mentioned above (completely individual price setting due to the product having no standard part), a price survey adopting a model pricing method using an average profit margin or average cost-to-sales ratio cannot be conducted in light of the availability of data at the respondents, and a price survey adopting a model pricing method using the average discount rate is conducted as an alternative method (the commodities "Mold, die & parts" and "Grinding machines" of the group "Production machinery"). In this case, the Bank collects from the respondents both the "regular price of a hypothetical product which does not exist in reality" and the "actual average discount rate of the product class, which is evaluated from the regular prices," and calculates the sample prices by the formula "regular price of the hypothetical product × (1 – actual average discount rate of the class)." This is an exceptional case that is

Figure 12: Model Pricing Method Using Average Discount Rate



Note: Total value of the product class in regular price denotes the total sales in the case of having sold the all products at the regular price.

### E-3-2-2. Model pricing method using average profit margin or average cost-to-sales ratio

When adopting the model pricing method using an average profit margin or average cost-to-sales ratio, the following information is collected from the respondents: (1) the "manufacturing cost" of the hypothetical standard product; and (2) the "average profit margin (= gross profit ratio = [total sales – total manufacturing cost] / total sales)" or the "cost-to-sales ratio (= total manufacturing cost / total sales)" of the product class. Then, according to the formula shown in Figure 13, the Bank calculates the sample price using the values of (1) and (2) above, assuming the standard product is continuously traded. With regard to (1) the "manufacturing cost" of the hypothetical standard product, either the actual value or a prospective value (the estimated cost or predetermined cost, etc. in management accounting) is used, depending on the trading practices or the availability of data at the respondents.

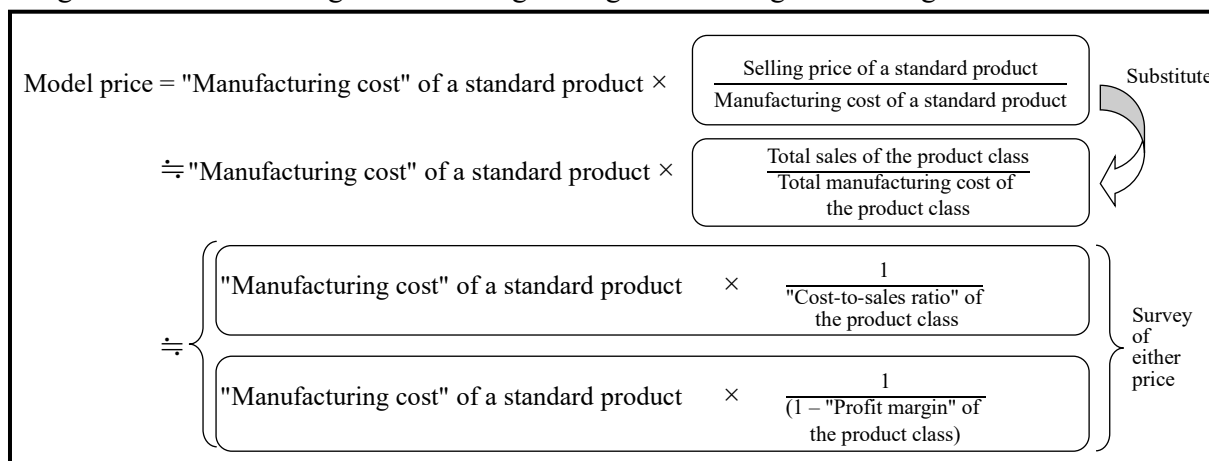
#### (a) Status of adopting the method in price surveys

The model pricing method using an average profit margin or average cost-to-sales ratio is adopted for the group "Production machinery" (the commodities "Mold, die & parts" and "Grinding machines") and the group "General purpose machinery" (the commodities "Boilers" and "Steam & gas turbines"), etc. in the PPI and the group "General purpose, production & business oriented machinery" (the commodity "Flat panel & display manufacturing equipment"), etc. in the EPI, in which many products are particularly highly customized.

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only taken when a price survey adopting a model pricing method using an average profit margin or average cost-to-sales ratio cannot be conducted.

Figure 13: Model Pricing Method Using Average Profit Margin or Average Cost-to-Sales Ratio



#### E-4. List price method

The list price method, which surveys the standard price, is adopted (1) when any of the following methods is difficult to adopt: the specification pricing method, the average price method, and the model pricing method, and (2) when the standard price (quoted price or invoice price, regular price × standard discount rate, catalogue price, etc.), which is used as a reference in actual transactions, is revised according to the actual price trends.

The advantage of the list price method is that it makes it easy to survey the pricing of products with constant quality. However, it has a disadvantage in that it may not sufficiently capture the market prices, if the standard price is not reflective of actual transactions, such as where the actual transaction price has deviated from the standard price.

##### (a) Status of adopting the method in price surveys

In the CGPI, the list price method is used as an alternative pricing method when none of the other three pricing methods is applicable. Accordingly, the number of sample prices adopting the list price method is only about 1 to 3 percent of the total, in the PPI, the EPI, as well as the IPI (Figure 7).

#### F. Usage of Alternative Data

Alternative data from statistics compiled by other organizations and third-party databases are used as sample prices in order to improve the index accuracy and reduce the respondent burden. The Bank determines whether to use alternative data by considering the following points: (1) whether the cost of using the alternative data is reasonable compared with the reduction of the respondent burden and (2) whether the quality level of the sample prices obtained from alternative data is the same as or better than that obtained from respondents.

The utilization ratio of alternative data is 5 percent (42 commodities) in the PPI, 12 percent (21 commodities) in the EPI, and 19 percent (29 commodities) in the IPI, showing a particularly high percentage in the IPI (Figure 14). The respective commodities have the following features.

Figure 14: Utilization Ratio of Alternative Data for All Commodities and for Each Group

PPI		EPI		IPI	
All commodities	5.4	All commodities	11.6	All commodities	19.4
Lumber & wood products	27.2	Metals & related products	20.2	Beverages & foods and agriculture products for food	22.9
Chemicals & related products	34.4	Chemicals & related products	35.4	Metals & related products	38.7
Ceramic, stone & clay products	34.8	Electric & electronic products	8.6	Petroleum, coal & natural gas	44.3
Electronic components & devices	5.3	Transportation equipment	7.9	Chemicals & related products	12.8
Agriculture, forestry & fishery products	26.3	Other primary products & manufactured goods	19.7	Electric & electronic products	6.4
Minerals	46.2			Other primary products & manufactured goods	3.0

Note: As of February 2017. The figures indicate the percentage of the weight of commodities with alternative data in all commodities or in each group.

**F-1. Alternative data for commodity products, such as energy, minerals (unwrought metals), and agricultural products**

The utilization ratio of alternative data tends to be high for commodity products, such as energy, minerals (unwrought metals), and agricultural products. As for the IPI, alternative data are largely used for commodities such as "Liquefied natural gas" and "Naphtha" under the group "Petroleum, coal & natural gas," eight commodities including "Iron ores" and "Unwrought aluminum" under the group "Metals & related products," as well as five commodities of agricultural products including "Corn," "Wheat," and "Pork" under the group "Beverages & foods and agriculture products for food." In the case of commodity products, highly accurate price data can be obtained from alternative data sources, as prices are often formed based on the law of one price, being linked to international commodity prices.

The above is also the case for the EPI. Alternative data are used for commodities whose prices are linked to Asian commodity price trends: 13 commodities including "Para-xylene" and "Styrene

monomer" under the subgroup "Industrial organic chemicals" of the group "Chemicals & related products"; the commodities "Unwrought gold" and "Unwrought copper" under the group "Metals & related products"; four commodities including "Gas oil" under the commodity class "Petroleum products" of the group "Other primary products & manufactured goods"; and the commodity "MOS memory integrated circuits" under the group "Electric & electronic products."

**F-2. Alternative data for commodities with large variation in price trends such as products produced in large varieties and in small volumes**

In cases where (1) many different products exist due to production in large varieties and in small volumes, (2) products have different regional price trends depending on the regions in which they are manufactured or traded, or (3) products are custom-made with different quality and different prices for each transaction, it is essential to collect a sufficient number of sample prices in order to improve the index accuracy. While doing so through surveys of respondents is difficult due to a large respondent burden, using alternative data enables the Bank to collect a large number of sample prices at low cost.

**(a) Case where many different products exist within a commodity due to production in large varieties and in small volumes: pharmaceutical products**

As for the commodity class "Ethical pharmaceutical products" (consisting of 22 commodities) under the group "Chemicals & related products" in the PPI, each commodity comprises many different pharmaceutical products, each with different price trends. Accordingly, the Bank uses the prices of the National Health Insurance (NHI) Drug Price Standard -- official drug prices -- provided by the Ministry of Health, Labour and Welfare. Specifically, the Bank selects the top 70 percent of the products in terms of production value for each commodity in the *Statistics of Production by Pharmaceutical Industry*, obtains the weighted average of the NHI's official drug prices by shares of production value, and compiles the commodity index. As a result, a large number of prices (a total of 771 products for the 22 commodities) can be incorporated into the index.<sup>5</sup>

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<sup>5</sup> Since the NHI's official drug prices are those presented by hospitals and dispensing pharmacies to patients, these prices do not strictly coincide with the shipment prices of pharmaceutical manufacturers. However, the profit margin rate of drug prices, which indicates the extent of the difference between the prices in the above two stages -- the rate of difference between the price at which a drug is sold by a pharmaceutical wholesaler to hospitals and dispensing pharmacies, and the price presented to patients -- has remained stable (the rate was 8.4 percent in 2011, 8.2 percent in 2013, and 8.8 percent in 2015, according to the results of the *Drug Price Survey* conducted by the Ministry of Health, Labour and Welfare and

**(b) Case where products have different regional price trends: commodities related to construction materials**

For commodities (seven commodities including "Ready-mixed concrete," "Prestressed concrete products," and "Gravel") under the groups "Ceramic, stone & clay products" and "Minerals" in the PPI, there are few arbitrage opportunities among regions due to the high transportation costs of the products, and therefore, there is regional variation in the price trends. Accordingly, the Bank uses alternative data -- the *Construction & Material Costs in Japan* provided by the Construction Research Institute -- and compiles commodity indexes by using data of up to 50 regions.

**(c) Case where products are custom-made with different quality and price for each transaction: Steel ships**

The commodity "Steel ships" under the group "Transportation equipment" in the EPI includes various types of ships, and there is large variation in their transaction prices. Therefore, the Bank uses the data of the *Survey on Shipbuilding and Engineering* conducted by the Ministry of Land, Infrastructure, Transport and Tourism. The data is categorized by ship type (by usage) -- such as "ore/bulk carrier," "bulk carrier," "chemical carrier," and "container ships" -- and by dead weight tonnage, and calculates the average shipment price per dead weight tonnage for each category. Then, it compiles the price index by obtaining the weighted average of such average shipment prices, using the shipment value of completed ships for each category as the weight data. By making use of the advantage of having access to vast data, the Bank sets detailed categories and calculates the price for each category, and thereby guarantees the constant quality of sample prices.

**G. Number of Sample Prices**

**G-1. Number of sample prices and of respondents**

The number of sample prices in the CGPI is 5,743 in the PPI, 1,288 in the EPI, and 1,576 in the IPI, which amounts to 8,607 in total (of these, 7,527 sample prices are collected from respondents and 1,080 are from alternative data sources) (Figure 15). Furthermore, the number of respondents is 1,971, with the number of sample prices per respondent (excluding data from alternative sources) being 3.8.<sup>6</sup>

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published in material submitted at a general meeting of the Central Social Insurance Medical Council). Therefore, the two prices are considered to be changing almost in parallel.

<sup>6</sup> While there are only one or two sample prices for some respondents, the Bank asks leading companies in each industry, which produce wide-ranging products and have large shares, to cooperate in reporting a large number of sample prices, greatly exceeding the average.

Figure 15: Number of Sample Prices

	Number of sample prices in the 2015 base index (of which are from alternative data sources )	[Reference] 2010 base index
PPI	5,743 (956)	5,977 (749)
EPI	1,288 (66)	1,277 (45)
IPI	1,576 (58)	1,538 (40)
Total of three price indexes	8,607 (1,080)	8,792 (834)

Note: The figures for 2015 base index are as of April 2016 and those for 2010 base index are as of April 2012.

## G-2. Number of sample prices per commodity

For the CGPI, the Bank collects at least three prices from multiple respondents for each commodity. In the case of commodities for which alternative data are used, sometimes, one or two prices are used since there is no need to keep the information confidential. As a result, the number of sample prices per commodity is 7.7 in the PPI, 6.2 in the EPI, and 6.1 in the IPI, and 7.1 for the three price indexes in total.

Looking at the number of sample prices per commodity in each group, in the PPI, it is large, at 10 to 12, for "Electric power, gas & water," which has complicated fee structures; "Chemicals & related products," which includes pharmaceutical products that are produced in large varieties and in small volumes; and "Minerals," which has large regional variation in price trends. On the other hand, the number is small, at about four or five, for "Petroleum & coal products" and "Agriculture, forestry & fishery products," since their prices are linked to commodity product prices and determined based on the law of one price. In the EPI, the number of sample prices is large for "Transportation equipment" (motor vehicles), for which the price trends differ by export destination. On the other hand, the number is small for "Chemicals & related products," which include many commodity products. Additionally, in the IPI, the number is rather large for "Textiles" (clothes), where products are produced in large varieties and in small volumes, but small for "Metals & related products" and "Petroleum, coal & natural gas," since their prices are linked to commodity product prices.

For the CGPI, the Bank controls the number of sample prices based on the features of each commodity, such as variation in the product quality and price trends. By doing so, the Bank aims to increase the efficiency of the price surveys and achieve compatibility between a reduction of the respondent burden and an improvement in the index accuracy.

### **G-3. Replacement of sample prices upon rebasing**

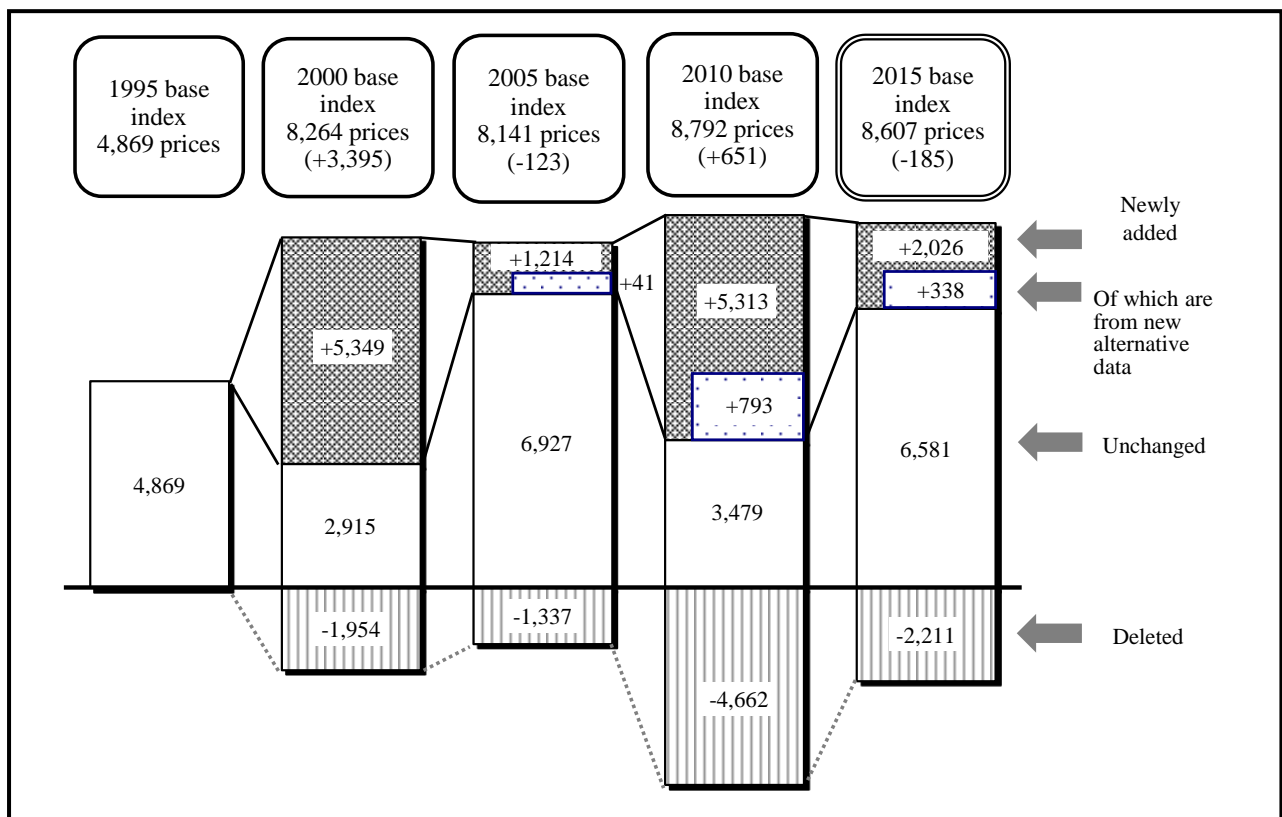
In order to maintain and improve the index accuracy, the sample prices of the CGPI are fully reviewed every five years at times of rebasing. Specifically, the Bank reviews the commodity classification to match the latest economic structure. Then, the Bank cultivates new sample prices, based on the new classification, in accordance with the abovementioned process flow in Sections C., D., and E.

For example, the Bank newly added 2,026 sample prices -- corresponding to a quarter of the total -- upon the 2015 rebasing and 5,313 sample prices -- corresponding to 60 percent of the total -- upon the 2010 rebasing, while deleting roughly the same number of sample prices (Figure 16). In order to maintain and improve the index accuracy, it is essential to constantly review the composition of the surveyed products and the pricing methods, and replace the old ones with new ones, so that sample prices reflect the actual structure of the economy.

From such viewpoint, the Bank engages in the work of reviewing sample prices, also at rebasing intervals, in accordance with the method indicated later in Section J. "Regular Maintenance of Sample Prices," and such initiative is extremely important for maintaining and improving the index accuracy.



Figure 16: Replacement of Sample Prices upon Rebasing



Note: The figures for 2015 base index are as of April 2016 and those for 2010 base index are as of April 2012.

## H. Characteristics of Sample Prices

Of the characteristics of sample prices that have been listed in Section B. "Survey Items," this section focuses on setting details of the following five characteristics that substantially affect prices: (1) the contract currency; (2) treatment of consumption tax; (3) the point in time when the price is recorded; (4) the stage of the supply chain; and (5) the terms of delivery/international commercial terms.

### H-1. Contract currency (see Component Ratio by Contract Currency in the EPI and IPI)

In reference to trading practices of respondents, sample prices of the CGPI contracted in Japanese yen are surveyed in yen while those contracted in foreign currencies are surveyed in foreign currencies.

For indexes on a yen basis, sample prices contracted in yen are directly used to construct the indexes, but sample prices contracted in foreign currencies are converted into prices in yen using

bank telegraphic transfer spot exchange rates (monthly average, middle rate).<sup>7</sup> On the other hand, for contract currency-based indexes that are published in the EPI and IPI, sample prices denominated in contract currencies are directly used to construct the indexes, using prices denominated in yen for sample prices contracted in yen and prices denominated in foreign currencies for sample prices contracted in foreign currencies.<sup>8</sup>

**(a) Composition ratio of contract currency in the EPI and IPI**

In the EPI, prices denominated in yen account for 38 percent and prices denominated in foreign currencies account for 62 percent (with prices denominated in U.S. dollars accounting for 52 percent), while in the IPI, prices denominated in yen account for 26 percent and prices denominated in foreign currencies account for 74 percent (with prices denominated in U.S. dollars accounting for 69 percent) (Figure 17). By group, "Metals & related products" and "Chemicals & related products" in the EPI, and "Petroleum, coal & natural gas," "Metals & related products," and "Beverages & foods and agriculture products for food" in the IPI include a high proportion of prices denominated in U.S. dollars, as their prices are highly linked to international commodity prices. Groups for which the proportion of prices denominated in yen exceeds 50 percent include "General purpose, production & business oriented machinery" in the EPI and "Textiles" in the IPI.

Figure 17: Composition Ratio of Contract Currency in the EPI and IPI

EPI					IPI				
Yen	Foreign currencies	U.S. dollar	Euro	Others	Yen	Foreign currencies	U.S. dollar	Euro	Others
37.8	62.2	51.6	5.9	4.8	26.2	73.8	68.8	3.2	1.9

Note: As of December 2016, based on an aggregation of the weights for each sample price.

Since the proportion of prices denominated in foreign currencies in the IPI is 12 percentage points higher than that in the EPI, when the yen depreciates (appreciates) in the foreign exchange market, the IPI is more inclined to see a rise (fall) on a yen basis, and Japan's terms of trade -- EPI divided by IPI -- tend to deteriorate (improve) in the short term.

<sup>7</sup> Therefore, the sample prices may be different from the actual prices that individual companies face in yen terms.

<sup>8</sup> In the PPI, almost all sample prices are contracted in yen, so the Bank only compiles indexes on a yen basis, and does not compile indexes based on contract currencies.

## **H-2. Treatment of consumption tax**

For the PPI, the Bank leaves the choice on whether to report prices including or excluding consumption tax to individual respondents. In fact, 96 percent of the prices are reported excluding consumption tax, while 4 percent of the prices are reported including consumption tax.<sup>9</sup>

Since the PPI is compiled by including consumption tax, in the case where a tax-exclusive price is reported, the Bank compiles tax-inclusive indexes by adding the consumption tax amount to the tax-exclusive price. On the other hand, in the reference index "PPI excluding Consumption Tax," the Bank compiles tax-exclusive indexes by deducting the consumption tax amount from the reported tax-inclusive prices.

## **H-3. Point in time when the price is recorded**

With regard to the point in time when the price is recorded, to the extent possible, the Bank surveys prices recorded at the time of shipment for the PPI, the time of cargo loading for the EPI, and the time of cargo unloading for the IPI. The Bank intends to respond more appropriately to the needs for using the price indexes as a deflator by making the point in time when the price is recorded consistent with that of the nominal value of shipments or international trades recorded.

In the CGPI 2015 base index, the time of shipment accounts for 75 percent in the PPI, the time of cargo loading accounts for 65 percent in the EPI, and the time of cargo unloading accounts for 87 percent in the IPI (Figure 18).<sup>10</sup> Incidentally, for some commodities in the EPI and IPI that use alternative data, a time lag occurs between the time when data is recorded and the time of actual cargo loading or unloading. In such cases, in order to match these points in time, the Bank adjusts the timing of reflecting the alternative data as sample prices. The Bank will continue to make efforts to unify the time when the price is recorded with the desirable timing, while considering the availability of data at the respondents.

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<sup>9</sup> The only tax-exempt products are beds for nursing care, which are included in the commodity "Beds & mattresses" under the group "Other manufacturing industry products"; all other commodities (products) are subject to consumption tax (as of February 2017).

<sup>10</sup> It is considered that the ratio of the time of cargo loading is slightly low in the EPI because, in many cases, export manufacturers -- mainly machinery makers -- transport their products themselves and usually record prices at the time of delivering the products to the customer at the port of the export destination (the time of unloading cargo from the ship).

Figure 18: Composition Ratio of the Time When the Price is Recorded

percent

PPI		EPI		IPI	
Time of shipment	75.4	Time of cargo loading	64.7	Time of cargo unloading	86.6
Survey on respondents	70.0	Survey on respondents	53.1	Survey on respondents	67.1
Alternative data	6.0	Alternative data	10.8	Alternative data	6.0
Time of contract	15.4	Time of contract	16.4	Time of contract	13.4
Others	9.2	Others	18.9	Others	0.0

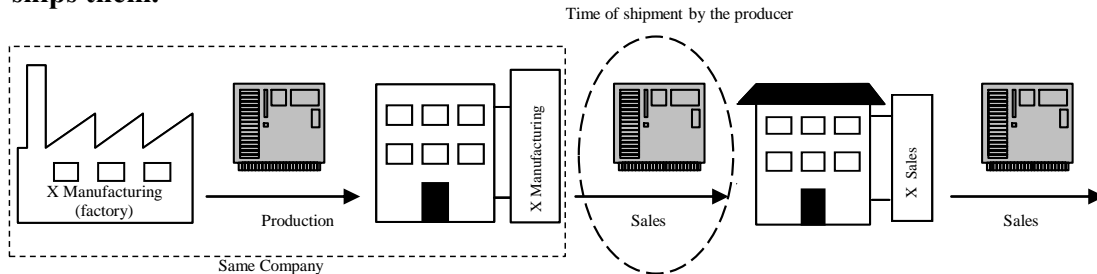
Note: 1. As of October 2016, based on an aggregation of the weights for each sample price.

2. "Others" includes the following: the time of payment for the PPI; the time of cargo unloading and of payment for the EPI; and the time of cargo loading and of payment for the IPI.

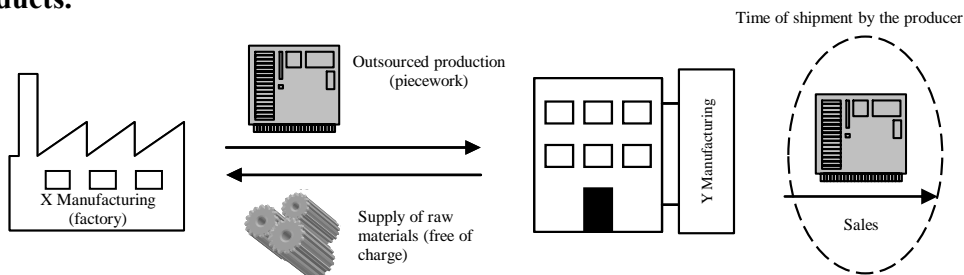
Figure 19: Definition of the Producer Stage

For the CGPI, the Bank regards (1) through (3) below as the producer stage in accordance with the rule for recording the value of shipments in the *Census of Manufacture*.

**(1) Stage where the manufacturer (X Manufacturing) produces products at its factory and ships them.**

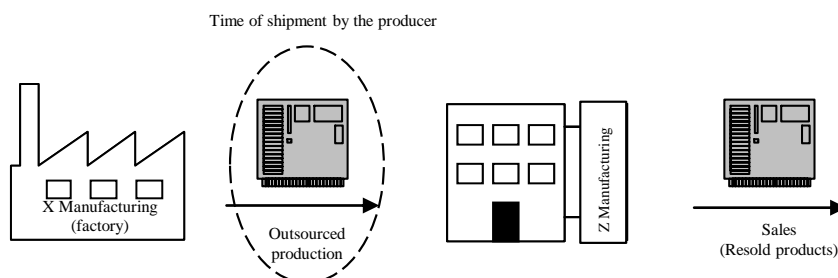


**(2) Stage where the outsourced manufacturer (X Manufacturing) produces products by using raw materials supplied free of charge by the outsourcing manufacturer (Y Manufacturing), and the outsourcing manufacturer (Y Manufacturing) ships the products.**



The outsourced manufacturer (X Manufacturing) provides an outsourced processing (piecework) service and does not produce goods. Therefore, the time of shipment by the outsourcing manufacturer (Y Manufacturing), which ships the goods, is regarded as the producer stage.

**(3) Stage where the outsourced manufacturer (X Manufacturing, a subsidiary of Z Manufacturing) produces products and the outsourcing manufacturer (Z Manufacturing, a parent company of X Manufacturing) purchases the products.**



The outsourced manufacturer (X Manufacturing) procures raw materials, so it is considered to be carrying out the production of goods. Even if the transaction takes place between a parent company and a subsidiary, as long as they are separate companies, the time of shipment by the subsidiary (in other words, the stage of purchase by the parent) is regarded as the producer stage.

#### **H-4. Stage of the supply chain at which the price is recorded**

With regard to the stage of the supply chain to be surveyed, to the extent possible, the Bank surveys prices recorded at the producer stage for the PPI, and at the customs clearance stage for the EPI and IPI. The Bank intends to respond more appropriately to the needs for using the price indexes as a deflator by making the stage of price recording consistent with that of the nominal value of shipments or the nominal value of international trades recorded.

##### **H-4-1. PPI**

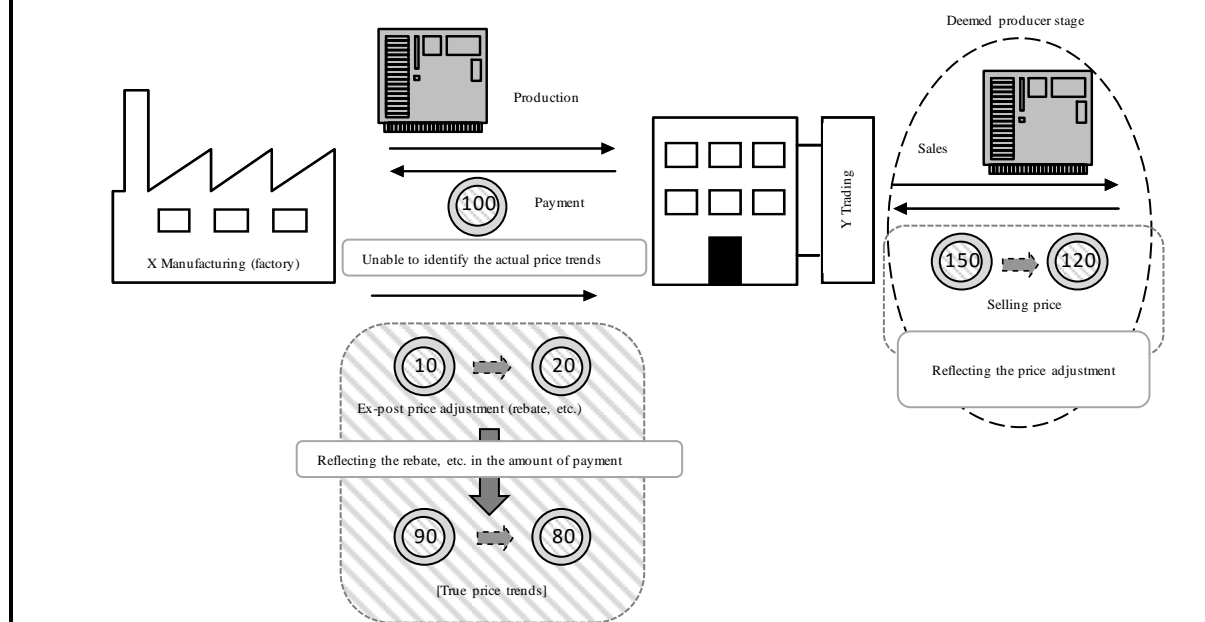
Basically, for the PPI, the Bank surveys the shipment price at the producer stage, as defined in Figure 19. The Bank has been making efforts to increase the producer stage ratio of the sample prices by utilizing an effective pricing method, such as appropriately reflecting rebates on prices. The ratio on a weight basis has increased from about 70 percent for the 1995 base index to 91 percent for the 2010 base index, and reached 95 percent for the 2015 base index. Non-producer prices, the remaining 5 percent, are mainly surveyed at the wholesale stage (Figure 20). The ratio of the wholesale stage is rather high, at 20 percent in the group "Beverages & foods" and at 27 percent in the group "Textile products," both groups for which there are cases where price surveys at the producer stage are difficult due to the existence of production outsourcing or complicated rebates.

Figure 20: Exceptional Case of Conducting a Price Survey at the Wholesale Stage

In the following case, it is difficult to survey a price at the producer stage that reflects the actual transaction, so as an alternative method, the price at the wholesale stage -- the stage at which the product is sold by the wholesaler to end users/retailers -- is surveyed.

**Case where the rebate (sales incentive) plays a substantial function in price adjustments, and the price including the rebate cannot be surveyed through the producer (X Manufacturing) paying the rebate, but can be surveyed through the wholesaler (Y Trading).**

-- There are cases where the rebate system at the wholesale stage (from wholesaler to retailer) is simpler than that at the producer stage (from producer to wholesaler), making it easier to conduct a price survey at the wholesale stage.



#### H-4-2. EPI and IPI

For the EPI and IPI, the Bank surveys sample prices at the customs clearance stage, but in the following two cases, it surveys the prices at other stages.

##### (a) Case where a ship or an aircraft loads fuel at a harbor or an airport

In the *System of National Accounts (SNA)*, an export or import is recorded at the time when the ownership of a product is transferred. According to this definition, fuel loaded onto a ship or an aircraft operated by an overseas company at a harbor or an airport in Japan and fuel loaded onto a ship or an aircraft operated by a Japanese company at a harbor or an airport overseas are also regarded as an export or import, although the fuel has not undergone customs clearance (in the *Trade Statistics of Japan*, this is recorded in Other Trade Related Statistics). Based on this idea,

the Bank surveys prices at the stage of loading fuel onto a ship or an aircraft in the case of the two commodities "Jet fuel oil & kerosene" and "Fuel oil C" in the EPI and IPI. The ratio of such sample prices is about 1 percent for both the EPI and IPI, based on the weights of samples.

**(b) Case where a survey is conducted at other stages in light of the availability of data at respondents**

Prices at the customs clearance stage sometimes cannot be obtained in light of the availability of data at respondents. In such case, the Bank surveys sample prices recorded when a product is shipped to a domestic exporter for the EPI, and surveys sample prices recorded when a product is purchased from a domestic importer for the IPI, if the Bank can conclude that the price trends of these alternative prices are sufficiently similar to the trends at the customs clearance stage. The ratio of such sample prices is slightly over 1 percent for the EPI and about 4 percent for the IPI, based on the weights of samples. For the IPI, the Bank uses such alternative sample prices rather frequently for the group "Textiles" (mainly clothes), for which the products are produced in large varieties and in small volumes, therefore making it difficult to survey prices at the customs-clearance-stage.

**H-5. Terms of delivery and international commercial terms**

Since the CGPI is the price index of goods, theoretically, the sample prices should not include various costs associated with the transactions, such as delivery fees and insurance premiums. This is also the case in terms of responding more appropriately to the needs to use the index as a deflator, such as for the *National Accounts*. However, in light of business practices or the availability of data at respondents, at present, the terms of delivery (PPI) and the international commercial terms (EPI and IPI) of sample prices in the CGPI do not necessarily follow such principle (see Component Ratio by International Commercial Terms in the EPI and IPI).

**H-5-1. PPI**

Based on the concept above, the Bank considers "Ex Works (EXW)," which does not include costs such as a delivery fee, as the desirable terms of delivery for sample prices in the PPI. However, in the PPI, only 30 percent of all sample prices surveyed at the producer stage are EXW, while 70 percent are "Delivered Free," which includes costs such as the costs for delivery to customers. In this way, many of the sample prices in the PPI include a delivery fee, which may not be desirable as a deflator.<sup>11</sup> "Delivered Free" products constitute most of the transactions,

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<sup>11</sup> The *System of National Accounts 2008* -- an international manual on national accounts -- states that the



because in Japan, it is a common business practice for the seller (producer) to deliver products to the location desired by the buyer (customer) -- for example, to the buyer's factory, warehouse, or construction site.

### **H-5-2. EPI**

For the EPI, in principle, the Bank sets Free on Board (FOB) as the international commercial terms of sample prices. Under FOB, the product buyer bears delivery fees and insurance premiums from a harbor in Japan to the export destination country, and the product seller (producer and exporter) does not bear such costs<sup>12</sup>. In fact, 60 percent of all sample prices in the EPI are FOB (Figure 21). By including sample prices obtained from alternative data sources that can be regarded as prices that are similar to FOB and producers' domestic shipment prices, the ratio of FOB reaches 72 percent. Thus, a relatively high proportion of the sample prices are desirable as a deflator.<sup>13</sup> At the same time, Cost, Insurance, and Freight (CIF) accounts for 25 percent and Cost and Freight (CFR) accounts for 4 percent, indicating that there is a certain portion of the sample prices subject to the international commercial terms where the sellers bear the costs of delivery and insurance.<sup>14</sup>

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producer's price (the basic price which constitutes the index to be used as a deflator) excludes any transport charges invoiced separately by the producer, while if the producer agrees to deliver the product to the purchaser without explicit charge, the cost of delivery is included in the producer's price (the basic price) (14.46 and 14.54 of Chapter 14). This means that a price including a delivery fee is appropriate as a deflator for the SNA, if the producer has not explicitly invoiced the fee to the customer separately from the invoice for the product. Indeed, in the *Census of Manufacture* and the *Current Survey of Production*, which are basic statistics of the SNA, the questionnaire clearly states that, in filling them in, it should be noted that the value of shipments should be entered as the EXW basis excluding charges for loading, transportation, insurance, etc. This indicates that the amount corresponding to the delivery fee is included in the value of shipments unless the producer explicitly invoices the fee to the customer. Considering these points, further examination is needed of how problematic the sample price including transportation costs is as a deflator.

<sup>12</sup> In Figure 21, the FOB group includes FOB, EXW, Free Carrier (FCA), and Free Alongside Ship (FAS), each of which mean that the product seller does not bear delivery fees or insurance premiums after the product leaves Japan.

<sup>13</sup> In the *National Accounts*, both export and import statistics are compiled under the condition of FOB.

<sup>14</sup> In Figure 21, the CIF group includes other international commercial terms such as CIF, Carriage and Insurance Paid to (CIP), and Delivered at Place (DAP), each of which mean that the product buyer bears delivery fees and insurance premiums after the product leaves Japan. In addition, the CFR group includes CFR and Carriage Paid to (CPT), each of which mean that the product buyer bears delivery fees but does not bear insurance premiums after the product leaves Japan.

### H-5-3. IPI

For the IPI, in principle, the Bank sets CIF as the international commercial terms of sample prices. Under CIF, transportation fees and insurance premiums from a harbor overseas to Japan are included in the product price. This is not necessarily a desirable condition as a deflator, for which price data should include prices of goods only. However, the Bank prioritizes CIF-based prices in the survey, considering the fact that prices to be declared in the customs clearance procedure are to be on a CIF basis and the availability of price data at the respondents.<sup>15</sup>

Looking at the international commercial terms specified in the IPI, CIF accounts for 47 percent, while FOB accounts for 32 percent and CFR for 10 percent, showing large variations (Figure 21). Almost the same degree of variations is observed when the prices obtained from alternative data sources that can be regarded as equivalent to FOB and purchase prices from the importer at the domestic transaction stage that can be regarded as equivalent to CIF are included (CIF accounts for 51 percent, while FOB accounts for 38 percent and CFR for 10 percent).

This is because, in the IPI, there is a wide range of varieties in the types of available price data, depending on the divisions of the respondents. In the surveys, the Bank prioritizes other conditions such as the selection of appropriate surveyed products and pricing methods in order to secure the index accuracy, and therefore, the variation in the international commercial terms is being tolerated.

Figure 21: International Commercial Terms in the EPI and IPI

	FOB	CFR	CIF	Value of shipments at the domestic transaction stage	Alternative data sources	Others
EPI	59.4	3.6	24.6	1.4	10.8	0.3
IPI	32.1	9.8	47.3	4.1	6.0	0.7

Note: As of December 2016, based on an aggregation of the weights for each sample price.

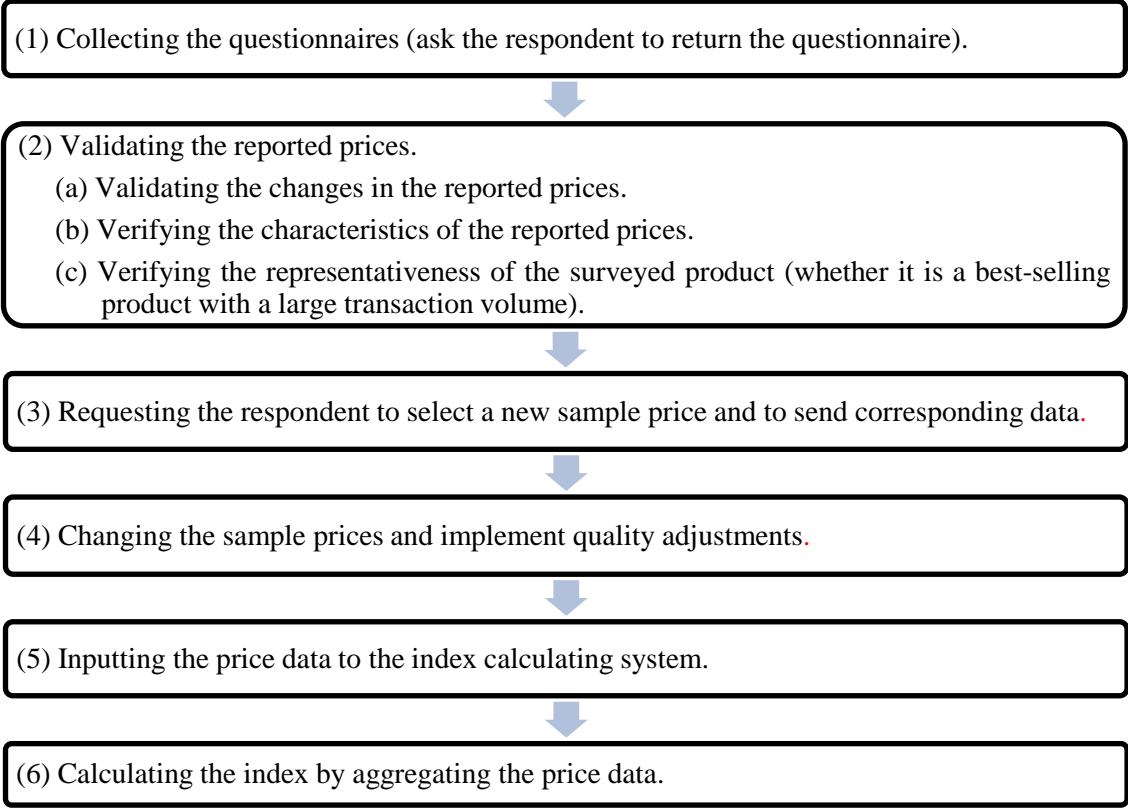
<sup>15</sup> Due to such circumstances, although import statistics in the *National Accounts* are compiled on an FOB basis, the IPIs in many countries including Japan are compiled from CIF-based prices. Besides, in the Trade Statistics compiled from data declared to customs, export statistics are compiled on an FOB basis and import statistics are compiled on a CIF basis, so a CIF-based IPI is desirable for deflating the import statistics.

**I. Procedure of Monthly Price Surveys and Index Compilation**

The price surveys for the CGPI are conducted on a monthly basis. The Bank surveys the prices of a month at the beginning of the following month, by sending questionnaires to respondents (see the Template of the Price Survey Questionnaire). In principle, the Bank collects the questionnaires in time for the release of preliminary indexes on the eighth business day (on the ninth business day for the scheduled retroactive revision in September). However, if the responses from some respondents are behind schedule and their price data cannot be reflected in the preliminary indexes, the Bank reflects the data in the indexes released two months after the reference month or later.

The Bank compiles price indexes according to the following procedure (Figure 22).

Figure 22: Procedure of the Monthly Price Surveys and Index Compilation



Note: Steps (3) and (4) are only conducted if it is found to be necessary in step (2).

**I-1. Collecting the questionnaires**

The Bank collects the questionnaire and checks whether there is any uncompleted data field. If some respondents are behind schedule in returning the questionnaires, the Bank contacts the respondents by telephone or other means to request them to return the questionnaires. If necessary, the Bank collects price data through telephone interview or other means.

## **I-2. Validating the reported prices**

The Bank conducts telephone interviews with the respondents and validates the following.

### **I-2-1. Validating the changes in the reported prices**

The Bank validates the reported prices, particularly those with large fluctuations. If any incorrectness is detected as a result of an interview with the respondent, the Bank corrects the reported data. Additionally, for prices with a complicated calculation process, such as the average price method or the model pricing method, the Bank confirms whether there is any gap in the understanding of the price calculation method and other procedures between the Bank and the respondent. At the same time, the Bank validates changes in the prices by conducting interviews with the respondent on the cause of the changes.

### **I-2-2. Verifying the characteristics of the reported prices**

If the reported price changes, it may be affected by a change in characteristics (quality) that affect the sample prices, such as the details of the product, contract currency, or customers. The Bank verifies whether there is any change in the characteristics, especially those that are not specified in the questionnaire.

### **I-2-3. Verifying the representativeness of the surveyed product (whether it is a best-selling product with a large transaction volume)**

There are cases where the transaction volume of a surveyed product decreases due to the discontinuation of sales or the release of a new successor product. For example, these are the cases where there was no trade of the product in a month -- therefore, the field for price data in the questionnaire is left blank -- or where the shipment volume has decreased and the price level has drastically changed. In such case, the Bank carefully verifies the representativeness of the surveyed product.

## **I-3. Requesting the respondent to select a new sample price and to send corresponding data**

If the surveyed product is found to no longer be representative through the process described in Section I-2-3, the Bank requests the respondent to select a new sample price and to send its data as necessary. In this process, the Bank holds an interview on the characteristics described in Section B. "Survey Items," such as the details of the newly selected product.

## **I-4. Changing the sample prices and implement quality adjustments**

After receiving data on the new sample prices as described in Section I-3, the Bank takes a

procedure to change the sample prices. It implements quality adjustments between the old and new sample prices based on the relevant information obtained together with the details of the characteristics obtained through the process in Section I-3.

#### **I-5. Inputting the price data into the index calculation system**

The Bank inputs the reported price data -- including the data of the new sample prices obtained through the process in Section I-4 -- into the index calculation system, which is a system that manages both the price data together with information on its characteristics. With regard to prices that require processing for specific data, such as with the model pricing method, the Bank uses a worksheet prepared for the processing in advance and inputs the result obtained from the worksheet into the index calculation system. The data input into the system are checked by two or more staff members, and extreme care is paid so as to prevent any input errors. In particular, changing a sample price involves inputting not only the price data, but also the data on quality adjustments and new characteristics into the index calculation system, so the Bank pays the utmost care in checking to prevent any input errors.

#### **I-6. Calculating the index by aggregating the price data**

After finishing the processes described in Sections I-1 through I-5, the Bank calculates the index for each group. In doing so, well-experienced supervisory staff members validate the index accuracy, by confirming that there is no unusually high fluctuation in the prices, and finalize the indexes. Subsequently, the higher-level indexes are calculated.

#### **J. Regular Maintenance of Sample Prices**

In order to compile highly accurate price indexes, it is important for the sample prices collected from the respondents to satisfy the following requirements:

- (1) Sample prices are selected to match the desirable composition ratio of each characteristic (product type, usage, producers, etc.) that was specified in Section C. "Selection of Sample Prices."**
- (2) The surveyed products are best-selling products with a large transaction volume.**
- (3) The characteristics (quality) that affect the sample prices are appropriately specified.**
- (4) The pricing method and the quality adjustment method appropriately reflect the actual price trends.**

In addition to (1) through (4), the following is of the utmost importance:

- (5) The questionnaires are returned by the respondents and the Bank can obtain the price data appropriately.**

In the process of rebasing once every five years, the Bank fully reviews the sample prices according to the procedure indicated in Sections C. "Selection of Sample Prices" and D. "Flow of Request for Price Survey." However, as corporate strategies have recently been changing faster because of the advancement of economic globalization and technological innovation, sample prices need to be reviewed more frequently. Therefore, the Bank carefully checks whether the individual sample prices are appropriate, not only in the rebasing phase but also in the monthly price surveys, particularly in terms of satisfying the requirements of (5) -- the questionnaires are returned and the Bank appropriately obtains the price data every month -- and (2) -- the surveyed products are best-selling products with a large transaction volume (transactions of the products continuously taking place).

Moreover, for problems that cannot be dealt with in the regular monthly price surveys and index compilation, the division in charge of compiling price statistics (Price Statistics Division of the Research and Statistics Department) discusses the details of the problems at a monthly meeting specialized into solving the individual problems. Then, the Bank promptly implements the following measures. Such appropriate maintenance of the sample prices is important for securing the index accuracy.

#### **J-1. Price survey request to new respondents**

The abovementioned case, where the surveyed product is no longer a representative (a best-selling one with a large transaction volume) may be brought about when the respondent discontinues producing, exporting or importing the surveyed product. In such case, it would be implausible to request the respondent to select the successor product to be surveyed. Therefore, the Bank selects new respondent candidates according to the procedures indicated in Section D. "Flow of Request for Price Survey," and requests different companies for their cooperation on the price survey.

#### **J-2. Approach respondents to gain cooperation on the survey**

If a respondent fails to respond smoothly to the survey, such as delaying the return of the questionnaire, the Bank repeatedly requests the company to cooperate by telephone. In addition, as necessary, the Bank visits the company for an interview and requests its cooperation on the price survey once again, as well as discusses various options with the respondent that could enable a smooth price survey, such as reviewing the contents of the survey.

**K. Response Status regarding Sample Prices**

**K-1. Response rate**

The response rate regarding sample prices is 65.2 percent as of the time when the preliminary indexes are released: on the eighth business day of the month following the reference month, or on the ninth business day for the scheduled retroactive revision in September. The rate rises to 92.2 percent as of three months after the release of the preliminary indexes. The response rate for the preliminary indexes is slightly low since the time to collect questionnaires is limited due to the early release of these indexes, but most prices are collected within three months after the release of the preliminary indexes (Figure 23).

Figure 23: Response Rate

	percent			
	Total	PPI	EPI	IPI
preliminary indexes	65.2	65.8	55.9	71.8
Indexes recalculated three months after being calculated as preliminary indexes	92.2	93.0	92.1	89.9

Note: 1. As of December 2020.

2. Response rate = total weight of sample prices collected by the time of the calculation of the indexes / total weight

**K-2. Sample prices that cannot be collected by the time of the release of the preliminary indexes**

For some sample prices, the Bank knows in advance that they cannot be reported by the respondents by the time of the calculation of the preliminary indexes.

An example of such sample prices is products with so-called later-determined prices, for which the transaction prices are not determined at the time of the transaction (shipment) but are determined ex-post-facto based on negotiations or on a certain rule (formula) between companies (Figure 24).<sup>16</sup> Such products are particularly notable for commodities in the PPI, for which long-term continuous transactions are conducted between the same companies, such as the

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<sup>16</sup> They are the sample prices of "products with later-determined prices," for which the contract period extends over several months and the transaction price for the period is determined after the start of the contract period, where estimate prices cannot be used as the sample prices.

following: commodities related to motor vehicle parts under the group "Transportation equipment," commodities for which long-term contracts for large customers are made under the group "Iron & steel," commodities related to motor vehicle parts under the group "Electrical machinery & equipment," and the commodity "Plastic parts for transportation equipment" under the group "Plastic products." Additionally in the EPI, later-determined prices exist for the commodity "Motors (excluding electronic components)" under the group "Electric & electronic products" and commodities related to steel under the group "Metals & related products," and similarly, in the IPI, commodities related to wood chips under the group "Lumber & wood products and forest products."

Another example is sample prices compiled by a complex pricing method such as the model pricing method using the average profit margin or average cost-to-sales ratio. Some of these prices are reported a month after the reference month or even later in light of the availability of the price data at the respondents. This is because, in many cases, various data necessary for calculating the price (such as the actual profit margin or cost-to-sales ratio) can only be obtained from the company's financial statements, which are usually available several months after the reference month.



Figure 24: Major Commodities Which Include Later-Determined Prices

PPI

Group	Weight (percent)	Major commodities
Transportation equipment	3.0	Parts of internal combustion engines for motor vehicles; Chassis & body parts; Drive, transmission & steering parts
Iron & steel	1.9	Hot rolled steel strips; Hot-dip zinc-coated steel sheets; Heavy steel plates
Electrical machinery & equipment	0.5	Wiring harnesses; Motors (excluding electronic components)
Plastic products	0.4	Plastic parts for transportation equipment
Total	6.2	

EPI

Group	Weight (percent)	Major commodities
Electric & electronic products	0.6	Motors (excluding electronic components)
Metals & related products	0.4	Hot-dip zinc-coated steel sheets; Electrolytic zinc-coated steel sheets
Total	1.1	

IPI

Group	Weight (percent)	Major commodities
Lumber & wood products and forest products	0.5	Hardwood chips; Softwood chips
Total	0.5	

**K-3. Implementation of revisions**

The reporting of sample prices may delay for various reasons -- including, but not limited to, the prices that cannot be collected by the time of calculating the preliminary indexes, such as the later-determined prices. The preliminary indexes are therefore subject to revision in each of the subsequent three months as additional information becomes available. In addition, scheduled retroactive revisions are performed to the released indexes once a year in September, along with the release of the preliminary figures for August. They are applied in principle to the indexes released after January of the previous year. In addition to these revisions, unscheduled revisions are conducted when timely revisions are deemed necessary, such as when changes to figures have a significant impact on the index of All commodities.

**L. Treatment of Missing Prices**

In the reference month, if there were no transactions under the conditions specified for sample prices (hence the field for price data in the questionnaire is left blank) or if the questionnaire was

not returned by the time of the monthly calculation of indexes and thus there were no responses from the respondents on price data, the prices of the month are treated as "missing prices."

In the CGPI, the Bank provisionally imputes missing prices until the actual prices can be obtained. In this process, (1) it is desirable to use an imputed price that is thought to be as close as possible to the actual price to be obtained later, in order to make the subsequent correction of the price small. At the same time, however, (2) the Bank also considers the need to use as simple a calculation method as possible due to there being an insufficient amount of time between the time when sample prices are collected and the release date of the preliminary indexes (Figure 25).

#### **L-1. General rule for the imputation method of missing prices: carry-forward**

In principle, the Bank imputes "missing prices" by the prices in the previous month (carry-forward prices). In intercompany transactions, since there are many commodities with high price stickiness, the carry-forward imputing method has the minimum bias when the true price change is not necessarily clear.

#### **L-2. Imputation method for commodities whose prices are highly correlated with commodity product prices: month-on-month percent change imputation**

For commodities whose prices are highly correlated with commodity product prices and are expected to fluctuate in the short term (the commodities "Crude petroleum," "Jet fuel oil & kerosene," etc. under the group "Petroleum, coal & natural gas" in the IPI), the missing prices are imputed by the average month-on-month percent change of the available sample prices within the same commodity.

#### **L-3. Imputation method for commodities whose prices are highly seasonal: year-on-year percent change imputation**

For commodities whose prices are highly seasonal and are expected to fluctuate in the short term (clothes-related commodities under the group "Textile products" in the PPI and the group "Textiles" in the IPI), the missing price is imputed by the year-on-year percent change of the previous month of the same price.

#### **L-4. Imputation method for commodities with later-determined prices: imputation based on estimated prices**

For commodities with later-determined prices, estimated prices that are provisionally set between companies can be sometimes used until the prices are properly determined. The missing price is

imputed by the estimated price if the extent of subsequent correction of the price appears to be limited.

**L-5. Imputation method for prices of seasonal products during the period the products are not available in the marketplace**

For clothes-related commodities under the group "Textile products" in the PPI and the group "Textiles" in the IPI ("Shirts," "Blouses," "Sweaters," etc.), a considerable number of sample prices are for seasonal products (e.g., spring and summer products, and autumn and winter products). For such products, because the period the products are available in the marketplace is limited, there is no transaction in the remaining non-sales season and the prices will be missing.

For such prices, the average price during the period the products are available in the marketplace (e.g., if the period is from February to July, the average price during the period) is used to impute the missing price for the subsequent period when the products are not available in the marketplace (from August to January of the following year, imputation is based on the average prices during the period the products are available in the marketplace).

**L-6. Timing for replacing the imputed prices with the actual prices obtained after imputation**

For all methods described in Sections L-1 through L-4, the imputed prices are replaced with the actual prices (the final prices in the case of being later-determined) when the price data are obtained. If the replacement cannot take place within three month after the release of the preliminary indexes, the imputed price will be replaced at the time of the scheduled retroactive revision.

**L-7. Treatment of contract currency in imputation**

In the EPI and IPI, the Bank firstly carries out imputation of the missing prices on a contract currency basis (indexes on a contract currency basis), using any of the methods described in Sections L-1 through L-5. Then, the yen-denominated prices (indexes on a yen basis) are calculated by reflecting the exchange rates in the corresponding month in the prices imputed on a contract currency basis.

Figure 25: Imputation Method of Missing Prices

Prices used for imputation		Details	Subject products
Price data of other available prices (including alternative data)	Average of month-on-month percent change	<ul style="list-style-type: none"> <li>• Imputed by the average month-on-month percent change of the available prices within the same commodity (three sample prices from multiple respondents are secured, in principle).</li> <li>• Imputed by the month-on-month percent change in prices from alternative data sources with similar price movements.</li> </ul>	<ul style="list-style-type: none"> <li>• Of products for which transactions are expected every month, products whose prices are highly correlated with commodity product prices and are expected to fluctuate largely in the short term (commodities such as "Crude petroleum" and "Jet fuel oil &amp; kerosene").</li> </ul>
Past data of the same sample price	Average of year-on-year percent change	<ul style="list-style-type: none"> <li>• Imputed by the year-on-year percent change of the previous month of the price (same level as the previous month on a year-on-year basis).</li> </ul>	<ul style="list-style-type: none"> <li>• Of products for which transactions are expected every month, products whose prices are highly seasonal and are expected to fluctuate largely in the short term (commodities such as "Shirts," "Blouses," and "Sweaters").</li> </ul>
	Estimated prices	<ul style="list-style-type: none"> <li>• Using prices provisionally set until the prices are properly determined.</li> </ul>	<ul style="list-style-type: none"> <li>• Products with later-determined prices or for which payments are subsequently settled (commodities such as "Naphtha," "Fuel oil C," "Ethylene," and "Propylene").</li> </ul>
	Average prices in the sales season	<ul style="list-style-type: none"> <li>• Imputed by the average prices in the sales season.</li> </ul>	<ul style="list-style-type: none"> <li>• Seasonal products (commodities such as "Shirts," "Blouses," and "Sweaters").</li> </ul>

## **M. Examination of the extent of index revision**

### **M-1. Effects of revision from the preliminary indexes to the indexes released in the following month**

Preliminary indexes of the CGPI are released on the eighth business day of the month following the reference month (the ninth business day for the scheduled retroactive revisions in March and September), which is particularly early compared to the release of various other economic indicators. Meanwhile, due to the early release of the preliminary indexes and the limited time available for collecting prices, the response rate as of the release of the preliminary indexes is slightly low at 65.2 percent (Figure 23).

In examining the accuracy of the preliminary index of the CGPI, the Bank checked the effect of index revision from the release of the preliminary indexes to the release of the indexes in the following month. In terms of the gross average (all commodities), the effects of index revision from the preliminary release to the release in the following month are generally small (Figure 26). The effects of the index revision on the gross average, in terms of average absolute value from January 2015 to January 2017, is 0.04 points for the PPI, 0.10 points for the EPI, and 0.20 points for the IPI. The amounts are considerably small compared to the average absolute value of the month-on-month percent change of the respective price indexes (from 2015 to 2016: 0.34 percentage points for the PPI, 1.55 percentage points for the EPI, and 2.67 percentage points for the IPI). The above result indicates that the indexes are sufficiently accurate to be used for the assessment of the underlying trend in inflation, and the promptness of the release and the accuracy of the indexes are both balanced.

However, the effects of index revision are slightly large for some group indexes (Figure 27). In the PPI, the effects of index revision sometimes become large for the groups "Electric power, gas & water," "Petroleum & coal products," "Beverages & foods," and "Production machinery," where many sample prices use the average price method or complicated model pricing method and the reporting of those prices by the companies often lags behind the release of the preliminary indexes. Similarly, as for the group "Iron & steel," the extent of revision becomes large when commodity product prices change significantly and therefore the later-determined prices are revised considerably from the price provisionally set. In the IPI, a delay in the price reporting for the group "Petroleum, coal & natural gas," which is subject to large changes in commodity product prices, accounts for the greatest part of the total effects of index revision.

Figure 26: Effect of Index Revision on the Gross Average Indexes between the Preliminary Indexes and the Indexes Released in the Following Month

points

	Average of revision effects		Range of revision effects		Frequency of revision effects (number of months)							
	Average	Average of absolute value	Min.	Max.	-0.4 or lower	-0.3	-0.2	-0.1	0.0	0.1	0.2	0.3 or higher
PPI	-0.04	0.04	-0.1	0.0	0	0	0	10	14	0	0	0
EPI	-0.06	0.10	-0.4	0.2	2	0	4	3	12	1	2	0
IPI	-0.13	0.20	-0.7	0.4	3	3	3	8	3	2	1	1

Note: 1. Covers the 24 months from January 2015 to January 2017 (based on the 2010 base index). The EPI and IPI are on a yen basis.

2. December 2016 is excluded from the calculation because the base year of the index is different between the preliminary indexes and the indexes released in the following month.

Figure 27: Effects of Index Revision in the PPI by the Group and Contribution to the Gross Average

absolute value, points

Group	Effects of revision	Contribution	Group	Effects of revision	Contribution
(1) Electric power, gas & water	0.31	0.016	(4) Production machinery	0.39	0.012
(2) Petroleum & coal products	0.25	0.014	(5) Iron & steel	0.21	0.012
(3) Beverages & foods	0.10	0.014	(6) Electrical machinery & equipment	0.20	0.010

Note: 1. Covers the 24 months from January 2015 to January 2017 (based on the 2010 base index).

2. December 2016 is excluded from the calculation because the base year of the index is different between the preliminary indexes and the indexes released in the following month.

3. The group "Beverages & foods" is renamed in the 2015 base index from "Food, beverages, tobacco & feedstuffs" of the 2010 base index.

## M-2. Effects of index revision at times of scheduled retroactive revisions

The effects of index revision on the gross average are small at the time of the scheduled retroactive revisions conducted semiannually until March 2021 and annually thereafter (Figure 28). In the PPI, the effects of index revision on the gross average are 0.1 points at most in each month covered by the revision, and the index is unchanged in most of the months even after the revision. That is also the case for the EPI and IPI. Thus, retroactive revisions of indexes hardly affect the assessment of the underlying trend in inflation.

However, the effects of the scheduled retroactive revision are slightly large for some group indexes (Figure 29). In the PPI, the effects are large for the group "Iron & steel." This is because the effects tend to be large in the commodities with later-determined prices under the group "Iron & steel," due to the long-term price negotiation between the producers and their major customers and to limited availability of the provisional estimated prices. In addition, the effects of index revision are also slightly large for the groups "Production machinery" and "Beverages & foods," where many sample prices use the average price method or complicated model pricing method and the reporting of those prices by the companies often lags behind the time of the release of the preliminary indexes.

Figure 28: Effects of Index Revision on the Gross Average Indexes  
in Scheduled Retroactive Revisions

		Average of revision effects		Range of revision effects		Frequency of revision effects (number of months)				
		Average	Average of absolute value	Min.	Max.	-0.2	-0.1	0.0	0.1	0.2
Last six months	PPI	-0.03	0.04	-0.1	0.1	0	9	14	1	0
	EPI	-0.03	0.05	-0.1	0.1	0	9	12	3	0
	IPI	-0.06	0.07	-0.2	0.1	3	9	11	1	0
Seven to twelve months ago	PPI	-0.02	0.02	-0.1	0.0	0	5	19	0	0
	EPI	-0.02	0.04	-0.1	0.1	0	7	15	2	0
	IPI	-0.04	0.06	-0.2	0.1	2	8	12	2	0

Note: Covers the four times of scheduled retroactive revisions conducted during the period from October 2015 to March 2017 (based on the 2010 base index). "Last six months" covers data for the last six months subject to the retroactive revisions (e.g., March 2017 revision refers to July to December of 2016). The frequency is based on 24 sets of data (coverage of six months × four times of respective retroactive revisions). The EPI and IPI are on a yen basis.

Figure 29: Effects of Index Revision in the PPI by the Group and Contribution to the Gross Average

absolute value, points

Group	Effects of revision	Contribution	Group	Effects of revision	Contribution
(1) Iron & steel	0.41	0.023	(3) Petroleum & coal products	0.21	0.012
(2) Beverages & foods	0.11	0.015	(4) Production machinery	0.34	0.011

Note: 1. Covers the four times of scheduled retroactive revisions conducted during the period from October 2015 to March 2017 (based on the 2010 base index). Average values for the last six months data.

2. The group "Beverages & foods" is renamed in the 2015 base index from "Food, beverages, tobacco & feedstuffs" of the 2010 base index.