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## **Rebasing of the Services Producer Price Index to the Base Year 2015**

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## **Rebasing of the Services Producer Price Index to the Base Year 2015\***

— Main features of the rebasing and price developments of the 2015 base index —

### **Abstract**

The Bank of Japan has rebased the Services Producer Price Index (SPPI), updating its base year from 2010 to 2015 and plans to begin monthly releases of the 2015 base SPPI from June 25, 2019, when indexes for April and May are scheduled to be published.

As a result of the rebasing, the coverage of the SPPI will expand and the number of sample prices will increase. This results from the incorporation of services that are not covered in the 2010 SPPI with the aim of reflecting changes in economic and industrial structures and meeting the demands for deflators including in the *System of National Accounts (SNA)*. Moreover, new sample prices have been added for existing items in response to structural changes such as the advancement of information and communication technologies, and the quality adjustment methods as well as pricing methods have been revised in order to improve the index accuracy.

As for the index level of "All items" in the 2015 base SPPI, figures after late 2017 have shifted somewhat upward compared to the 2010 base SPPI. Moreover, the year-on-year changes of the index have shifted somewhat upward in many months during the period from late 2017 through 2018. These upward shifts are mainly attributable to the incorporation of sample prices related to the internet, reflecting recent digitalization in service industry.

During the process of this rebasing, a number of companies cooperated with the Bank and constructive opinions were received from relevant experts. The Bank will continue to closely exchange views with companies and users, so as to continually review its price statistics.

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\* This paper is an English translation of the Japanese original released on June 18, 2019 by the Price Statistics Division, Research and Statistics Department (email: post.rsd3@boj.or.jp).

## 1. Introduction

The Research and Statistics Department of the Bank of Japan (hereinafter, the Bank) has rebased the Services Producer Price Index (SPPI), updating its base year from 2010 to 2015. After the result of this rebasing is presented in this paper, indexes for April and May will be published — scheduled on June 25, 2019 — in 2015 base index (hereafter, new index), instead of the current 2010 base index (hereafter, old index).

Before rebasing, the Bank released the *Basic Policy* in May 2018 to solicit widely for opinions, and after taking into account the valuable opinions and proposals from experts in various fields, published the *Final Draft* in March 2019.<sup>1</sup> As priority themes for the rebasing, the Bank laid out three points: (1) to reflect changes in economic and industrial structures; (2) to improve the index accuracy; and (3) to respond to government refinement of economic statistics, meeting the demands for deflators. This paper describes how the 2015 base SPPI ("new index") was prepared along the above themes, focusing on classification, weights, and changes from the 2010 base SPPI ("old index").

The explanation of the new index is presented in the following way: an overview of the classification and other features (Section 2); price developments in comparison with the old index (Section 3); rebasing effects on the index for "All items" (Section 4).

## 2. Overview of the Classification and Other Features in the New Index

This section outlines the coverage and number of items in the new index, and then explains changes in weights from the old index.

### 2.1. Coverage and the Number of Sample Prices

As announced in the *Final Draft*, upon rebasing, the Bank has incorporated new services to reflect changes in economic and industrial structures, and has also begun price surveys on services such as wholesale services, intending to meet the demands for deflators including in the *System of National Accounts (SNA)*.

As a result of these updates, the coverage (transaction value of business-to-business services selected in the SPPI / total transaction value of business-to-business services) in the new index increases significantly (Chart 1 [1] and [2]). Looking at the Basic grouping index — which comprises "All items" — the coverage rises from 50.5 percent

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<sup>1</sup> Both the "Basic Policy" and the "Final Draft" of the *Rebasing of the Services Producer Price Index to the Base Year 2015* are available in Japanese only.

in the old index to 56.4 percent in the new index. On a basis of "All items including Wholesale trade" — calculated by adding the Wholesale Services Price Index (WSPI), a Reference index, to "All items" — the coverage increases to 71.3 percent.<sup>2,3</sup> Moreover, in the new index, the Bank has begun price surveys on "Intellectual properties licensing" as part of the Services Export Price Index and Services Import Price Index (these are Reference indexes and are not included in the coverage).

In order to survey prices in a broader range of services, upon rebasing the Bank has expanded the number of sample prices considerably, while managing to maintain index accuracy by virtue of cooperation from a number of respondents.<sup>4</sup> Looking at the total number of sample prices in the Basic grouping index and the Reference indexes, that of the new index increases significantly from 3,533 in the old index to 4,758 (Chart 1 [3]). The breakdown of this change (an increase of 1,225) is as follows: 2,159 sample prices have been newly added, while 934 sample prices have been deleted. Around 40 percent of the newly added sample prices (an increase of 852) is due to the introduction of price surveys on wholesale services. Meanwhile, the deleted sample prices are mostly due to those with decreased representativeness being replaced by more representative ones.

## 2.2. Number of items

In the new index, the number of items in the Basic grouping index decreases by one to 146 from 147 in the old index. This is because the overall decrease in items due to a deleted item (a decrease of one) and consolidated items (a decrease of 11) exceeds the overall increase resulting from newly added items (an increase of six) and split items (an increase of five) (Chart 2).<sup>5</sup>

## 2.3. Weights

Weights of major groups in the new index do not change significantly from the old index (Chart 3 [1]). The weight of "Real estate services" expands reflecting an increase

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<sup>2</sup> For publication of the WSPI, see Appendix 1.

<sup>3</sup> The services that have large weights in business-to-business services and remained uncovered in the SPPI include the following: financial intermediation services indirectly measured (FISIM; account for 22.1 percent of total uncovered services); research and development (intra-enterprise; 21.7 percent of the total); and retail services (14.2 percent of the total).

<sup>4</sup> In the SPPI, information acquired from respondents on prices of surveyed services and on characteristics (quality) which may affect the prices is collectively referred to as "sample prices," and the minimum unit for the indexes compiled and published based on these sample prices is called "item."

<sup>5</sup> The item "Private broadcasting" is deleted due to a decline in the income of private broadcasting companies on a business-to-business basis.

in the transaction value of real estate services through 2015. The weight of "Leasing and rental" also increases, mainly reflecting rises in the transaction values of "Construction machinery and equipment rental" and "Temporary material rental," which have been brought about by increases in construction demand and restoration-related demand.

Item weights change reflecting factors such as shifts in the market size of the corresponding services during the period from 2010 through 2015.<sup>6</sup> For example, looking at internet-related services as well as services relating to construction, restoration, and infrastructure, the weights of some items exhibit increases (Chart 3 [2]). Meanwhile, the weights of items such as "Database provision services," "Fixed telephone services," and "Newspaper advertising" decrease. Among these, the weight decreases in "Database provision services" reflect the market contraction of database provision services excluding those via the internet (i.e., database provision services via media such as magnetic tape and CD-ROM).

For the new index, the Bank will release "All items including Wholesale trade," in order to capture price developments in overall business-to-business services including wholesale services. Setting the weight of "All items" to 1,000, the weights of "Wholesale trade" and of "All items including Wholesale trade" are 239.6 and 1,239.6, respectively. This means that, in the weight of "All items including Wholesale trade," that of "Wholesale trade" accounts for 19.3 percent ( $= 239.6/1,239.6$ ).

### **3. Price Indexes in 2015 Base**

This section explains price index movements in the new index, in comparison with those in the old index, for the period from January 2015 through March 2019.

#### **3.1. Index for "All items"**

The index level of "All items" in the new index (CY2015=100) had largely followed the same movements with the old index until the middle of 2017. However, figures after late 2017 have shifted somewhat upward compared to the old index (Chart 4). Moreover, the year-on-year changes of "All items" in the new index have been around one percent (1.4 percent at most) since late 2017. The year-on-year changes are somewhat higher compared to the old index by 0.1-0.3 percent point in many months during the period from late 2017 through 2018.

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<sup>6</sup> The changes in weights by item are attributable not only to shifts in the market size of the corresponding services, but also to changes in the basic statistics used for weight calculation and in the weight calculation method.

Year-on-year changes for "All items" in the new index show that a majority of major groups, such as "Other services," "Transportation and postal activities," and "Information and communications," have made positive contributions (Chart 5). In this regard, it has been reported that the heightening of the labor shortage has led to service price rises, particularly in the case of "Civil engineering and architectural services," "Worker dispatching services," and "Security services" in "Other services," as well as "Road freight transportation" in "Transportation and postal activities." This means that in the overall picture, where service prices have been rising mainly in services with acute labor shortages, there is no significant change from the old index.

## **3.2. Indexes for Individual Items**

This subsection explains changes in indexes for the individual items in the following order: (1) revised existing items, and (2) newly added items and reference indexes.

### **3.2.1. Revised Existing Items**

#### **(1) Revisions to reflect changes in economic and industrial structures**

In view of changes in economic and industrial structures, new services have been incorporated into existing items upon this rebasing. Reflecting in particular the digitalization of the service sector, the Bank has expanded the number of sample prices mainly for services which have been significantly affected by the advancement of information and communication technologies.

#### **(Internet based services)**

"Internet based services," an item in the old index, has been split into two items upon rebasing — namely, "Web portals" and "Internet support services" — mainly in view of the expansion of web portals in recent years. By virtue of cooperation from a number of companies, the Bank surveys prices such as listing and selling fees through a larger variety of web portals in the new index relative to the old index (Chart 6 [1]).

Looking at price developments for each item after the split, the index for "Web portals" has risen somewhat recently, mainly reflecting increases in listing fees at real estate listing websites and job search websites, both of which are newly surveyed web portals (Chart 6 [2]). On the other hand, the index for "Internet support services" has been on a moderate declining trend, mainly reflecting fee reductions amongst payment agency

services. The subgroup "Internet based services" in the new index consists of three items, the above two items and "Internet data centers."<sup>7</sup>

Index fluctuations for "Internet based services" are contained in the new index relative to the old index mainly due to substantial increases in the number of sample prices (Chart 6 [3]). Furthermore, the new index shows a moderate upward trend in recent years. This is as a result of the incorporation of services exhibiting price rises in "Web portals," for which sample prices have been expanded.

### **(Internet advertising)**

As for the item "Internet advertising," considering the increase in the item's transaction value, the Bank has considerably expanded the number of sample prices, by incorporating new types of transactions brought about by the advancement of advertising distribution technologies.

Specifically, it has added sample prices for programmatic advertising and affiliate advertising (a type of advertising for which compensation is linked to performance) — both of which have seen increases in transaction values in recent years (Chart 7 [1]).<sup>8</sup> The Bank has also incorporated various pricing units for "Internet advertising," such as pricing per impression, pricing per click, and pricing per conversion (Chart 7 [2]).<sup>9</sup> In comparison with the old index, pricing per click and pricing per conversion account for greater shares in the new index, which reflects an increase in the number of companies that prioritize advertising that encourages a direct response from consumers.

Due to the considerable expansion of sample prices and the resultant improvement in the index accuracy, the index of "Internet advertising" in the new index exhibits movements that differ to some extent from the old index (Chart 7 [3]). In the new index,

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<sup>7</sup> The item "Internet data centers" has moved to the subgroup "Internet based services" from the subgroup "Fixed telecommunications services," given the revision to the classification in the *Input-Output Tables*.

<sup>8</sup> Programmatic advertising refers to a type of advertising where advertisement is effectively distributed based on analyzing a substantial amount of data, including an individual's purchase information and browsing history. Such advertising is transacted by way of auction on a real-time basis, and thus price setting differs from reservation advertising for which period, content, and fee are fixed in advance.

<sup>9</sup> When the aim of advertising is to make consumers recognize a company name, a product, etc., it is appropriate to select pricing per impression (price per display). Meanwhile, when the aim is to lead consumers to a certain webpage of a product by making them click on an advertisement, it is suitable to adopt pricing per click. As for affiliate marketing — under which a desirable action from consumers, such as purchasing of a product, is considered essential — it is appropriate to select pricing per conversion (price per desirable action).

prices since 2017 have been on an upward trend, reflecting a rise in demand for internet advertising.

### **(Custom software)**

"Custom software," an item in the old index, has been split into two items upon rebasing — namely, "Embedded software" and "Custom software (except Embedded software)." This is in order to more precisely capture price developments in services in the field of software development, for which demand has been increasing. As for "Embedded software," in view of the rapid advancement of driver assistance technologies for automobiles and the broader application of the Internet of Things (IoT) in electrical machinery and equipment, the Bank surveys prices for services developing software that are embedded in such evolving instruments (Chart 8 [1]).

At present, there is no significant difference between the index trends exhibited by the two newly split items, and both have been on a rising trend, mainly reflecting the shortage of software engineers (Chart 8 [2]). For this reason, no considerable difference is observed between the old and new indexes, when looking at movements in the index for "Custom software" as a whole (Chart 8 [3]).

## **(2) Revisions of the quality adjustment methods**

Upon this rebasing, as announced in the *Final Draft*, the Bank has revised quality adjustment methods for "Advertising services" and "Property and casualty insurance services." As a result of the revisions, index movements for some items exhibit differences between the old and new indexes.

### **(Advertising services)**

Upon this rebasing, the Bank has revised the quality adjustment methods for two items — namely, "Newspaper advertising" and "Television advertising (program sponsorships)" — (see Appendix 2 for details). The quality for these types of advertising is considered to improve in line with increases in the number of advertising viewers. In order to capture the extent of such quality improvement, in the new index the Bank estimates through regression analysis, the average percentage change in the unit price of advertising pushed up by a one percentage increase in the number of advertising viewers, and makes quality adjustments using the parameter obtained through the estimation.

As for "Newspaper advertising," in the old index, on the assumption that the quality of advertising is directly proportional to the number of copies sold, the Bank uses "column price per copy" — calculated by dividing "column price (price per column)" by the number of copies sold.<sup>10</sup> As mentioned in Appendix 2, however, this directly proportional relationship might not be the case in recent years. Taking this into account, in the new index, the Bank estimates the relationship between the quality of newspaper advertising and the number of newspaper copies sold through regression analysis, and makes quality adjustments using the results obtained through the estimation. Due to this revision in the quality adjustment method, the extent of rise in the new index for "Newspaper advertising" has become more moderate than in the old index (Chart 9 [1]).

Turning to "Television advertising (program sponsorships)," in the old index, the Bank uses "price per air time" as a pricing unit, while putting off making quality adjustments in terms of the viewer ratings. However, it is sure that a rise in such ratings leads to improvements in advertising quality; thus, introducing such quality adjustments is considered to improve the index accuracy. In the new index, as is the case with "Newspaper advertising," the Bank introduces quality adjustments through regression analysis. With fluctuations smoothed out, the price level after 2016 in the new index is somewhat higher than that in the old index, reflecting the trend decline of viewer ratings (Chart 9 [2]).

### **(Property and casualty insurance services)**

The quality of insurance services changes depending on the amount of risk covered by the insurance. For this reason, the Bank begins to compile price indexes in the new index that are adjusted for risk amount for the following two items under the subgroup "Property and casualty insurance services": "Compulsory motor vehicle insurance" and "Voluntary motor vehicle insurance" (see Appendix 3 for details). As a result of these adjustments, the price indexes in the new index are somewhat higher than those in the old index (Chart 10). This is attributable to the eliminated effects from the index movements in "Property and casualty insurance services" of lower accident probability (i.e., reduced amount of risk covered by the insurance) due to improved safety features in automobiles.

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<sup>10</sup> A "column" here refers to a block 1/15 of one page of newspaper in height. In Japan, a fee for inserting advertising in a newspaper is decided using this column as a pricing unit. In compiling price statistics, after specifying a certain place in the newspaper and a type of business, the Bank surveys "column prices" — calculated by dividing the actual income from advertising by the total number of columns in which advertising is listed.

### **(3) Revisions of the pricing methods of sample prices**

#### **(Domestic air passenger transportation and International air passenger transportation)**

With a view to improving the index accuracy, the Bank has revised the pricing methods applied to the items "Domestic air passenger transportation" and "International air passenger transportation." In the old index, the Bank compiled the price indexes for these items mainly using published catalogue prices, but in the new index, it surveys the "average price per seat" compiled using actual transaction prices. In more detail, the "average price per seat" is compiled by specifying conditions — such as departure airport, destination airport, travel class, and fare type — and then dividing total sales revenue by number of seats sold.<sup>11</sup>

In recent years, fare pricing by airline companies has become more varied, as exemplified by the expanded introduction of fares depending on seat availability, under which a fare changes in line with the predicted number of empty seats for each flight. The average price method in the new index allows the Bank to capture overall price developments, including those of fares depending on seat availability, which cannot be obtained from price catalogues. This method also allows the Bank to incorporate actual price developments that vary depending on the type of sales channels (e.g., sales through an agent) into statistical data. Due to these features of the average price method, in the new index, both of the items "Domestic air passenger transportation" and "International air passenger transportation" exhibit the index movements that differ from the old index (Chart 11).<sup>12</sup>

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<sup>11</sup> For services on some types of flights — such as those in business class — in "International air passenger transportation," the Bank continues with price surveys using catalogue prices. This is due to the difficulty in surveying the prices for such flights on the basis of a specific fare type. Moreover, in the new index the Bank ceases to publish the following three indexes that comprise "International air passenger transportation" in the old index: "International air passenger transportation (to/from North America)"; "International air passenger transportation (to/from Europe)"; and "International air passenger transportation (to/from Asia)." This is in order to reduce the increased respondent burden resulting from the switch in pricing method from that based on "catalogue prices" to that based on "average price per seat."

<sup>12</sup> As for the sample prices in the item "International air passenger transportation" — reflecting the introduction of the "average price per seat" and the resultant incorporation of fares that are lower than catalogue prices in the new index — the proportion of fuel surcharges in the sample prices is higher in the new index relative to the old index on average. Hence, the index for "International air passenger transportation" in the new index is more susceptible to price movements in fuel surcharges compared to that in the old index; this is one of the reasons which leads to the expanded rate of price rises in the new index since entering into the phase of rising crude oil prices (i.e., since 2017).

#### **(4) Refinements in terms of the classification**

##### **(Split items)**

Upon this rebasing, the Bank has split some items, or has revised methods for splitting items, with a view to enhancing the usability of the SPPI as an economic indicator, as well as to improving its user-friendliness.

For example, the classification of the items related to "Motor freight transportation" changes from that based on contract type and automobile body type in the old index to that based on freight type in the new index (Chart 12 [1]). In the new index, indexes for all items have been on an uptrend, mainly reflecting the shortage of drivers, although seasonal fluctuations are exhibited by the index for the item "Motor freight transportation (Agriculture, forestry & fishery and food products)." Looking at the item "Motor freight transportation (Mineral and chemical products)," the price index has been rising significantly since 2018 reflecting a series of hikes in several sample prices. The price hikes may be attributable to an aspect of this item in which the supply of drivers and automobiles tend to be constrained due to the high frequency of transporting hazardous materials and of using special motor vehicles.

The subgroup "Worker dispatching services," which is classified into two items, "Clerical support supply services" and "Help supply services (except Clerical support)," in the old index, is classified into three items in the new index — namely, "Dispatch of professional and engineering workers," "Dispatch of clerical and sales workers," and "Dispatch of manufacturing and logistics workers" — (Chart 12 [2]). As it has been reported from respondents that supply-demand conditions for dispatched workers have been tightening due to labor shortages, the indexes for all of the above three items continue to be on a rising trend. At the moment, the index for the item "Dispatch of manufacturing and logistics workers" exhibits the highest pace of rise amongst the three items.

##### **(Consolidated items)**

Upon this rebasing, the Bank has conducted the consolidation of some items, mainly in view of reducing the respondent burden. An example of this is the revision of the subgroup "Financial services (commission)," for which classification is more specific in the old index relative to that represented by the *Input-Output Tables*. Upon rebasing, the Bank has reduced the number of items in this subgroup through the consolidation of

items (Chart 13).<sup>13</sup> Specifically, fees concerning banking services provided mainly by banks have been consolidated into two items — namely, "Money transmission and receipt" and "Commissions from banking services (except Money transmission and receipt)."<sup>14</sup> The index for the item "Commissions from banking services (except Money transmission and receipt)," has been rising, mainly due to price rises in deposit and loan business, which has a large weight in the item.

### **3.2.2. Newly Added Items and Reference Indexes**

#### **(1) Newly added items in the Basic grouping index**

In the rebasing, six new items have been introduced to the Basic grouping index — which comprises "All items" — intending to accommodate the demands for the GDP deflator and to reflect changes in economic and industrial structures.

#### **(Accommodating the demands for the GDP deflator)**

Two new items have been added in order to accommodate the demands for the GDP deflator: "Real estate agency and management services" and "Television program production." Of the two, the introduction of "Real estate agency and management services" corresponds with the rebasing of the SNA conducted in 2016. Upon this rebasing, real estate commission on transaction of dwelling and residential land is recorded as gross fixed capital formation in the SNA, which was until then, included in intermediate consumption. Similarly, "Television program production" corresponds to the recent discussion of whether to include the entertainment, literary or artistic originals in gross fixed capital formation in the next rebasing of the SNA.<sup>15</sup>

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<sup>13</sup> Other than the above, the following revisions have been made to the subgroup "Financial services (commission)" upon rebasing: the item "Interchange fees for credit card and electronic money payments" under this subgroup has been renamed as "Interchange fees for credit & debit card and electronic money payments," and this item's coverage has been expanded. While "Interchange fees for credit card and electronic money payments" in the old index covers services providing means of payment — such as credit card and electronic money — to retailers, in the new index, "Interchange fees for credit & debit card and electronic money payments" covers not only these services but also services providing means of payment including debit card, taking into account the diversification of payment methods. Meanwhile, although fees pertaining to cashless payment methods — such as those via virtual currencies and QR codes — may conceptually be subject to survey in this item, these fees are not incorporated as sample prices at present because their transaction values as of 2015 seem to be fairly modest.

<sup>14</sup> The item "Commissions from banking services (except Money transmission and receipt)" covers new sample prices, such as fees for exchanging money, in addition to the prices classified as the following items in the old index: "Account services," "Financial agency services," and "ATM interchange fees."

<sup>15</sup> Services that produce sound information and video contents other than television programs (i.e.,

The item "Real estate agency and management services" surveys brokerage fees in trading or leasing of real estates, and management fees of real estates. Brokerage fees are calculated by multiplying the average brokerage commission rates surveyed from reporting companies by an indicator that reflects price movements of the target property, e.g. the Japan Residential Property Price Index. Management fees are calculated in two ways. One is similar to the method in brokerage fees: surveying management commission rates from reporting companies and multiplying them by an indicator that reflects the rent of the property, e.g. "Office space rental" in the SPPI. Another way is to directly survey actual transacted fees. The item's price index calculated in such a way shows a gradual upward trend after 2015, albeit with some fluctuations (Chart 14[1]); this is due to the rise in both commission fees, rather gradually, and prices and rents of the target property while the real estate market has improved.

"Television program production" surveys the price of television program production services, for instance, the outsourcing costs from television stations to production companies. Surveying continuously the price of a television program whose content does not change rapidly, to some extent, it is conceivable to construct a price index with constant quality. At this point, the price index of the item remains almost flat (Chart 14[2]).

#### **(Reflecting the changes in economic and industrial structures)**

Regarding the expansion in transaction, four new items are introduced: "Non-destructive testing services," "Financial product and commodity exchange services," "Liability insurance," and "Health and hygiene." "Non-destructive testing services" surveys the price of services that inspect structures such as tunnels, bridges, power plants, and so on without damaging them by using radioactive rays or ultrasonic waves etc. "Financial product and commodity exchange services" surveys the commission fees for transactions in financial instrument and commodity futures exchanges. In "Liability insurance," prices of product liability insurance and insurance related to information leakage (e.g. cyber insurance) are surveyed. For "Health and hygiene," medical examinations for employees, mental health related services and so on are surveyed. Pricing methods are as follows: for "Non-destructive testing services" and "Financial product and commodity exchange services," where a similar service is less likely to be repeated, model pricing method — that assumes a particular service or amount transacted — is dominant. For "Liability insurance" and "Health and hygiene,"

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advertising and movies, etc.) remain uncovered in SPPI because surveying the price with constant quality guaranteed is extremely difficult.

the majority of sample prices adopt specification pricing method (direct use of prices of repeated services) which specifies the details of service.

The accumulated data periods for newly added items are still in short supply and making an analysis on their indexes requires more data (Charts 15 and 16). However, already an upward trend can be confirmed explicitly in the price index of "Non-destructive testing services." As the reporting companies say, such a trend is lasting due to the shortage of technical experts.<sup>16</sup> Also, the progress of deterioration in infrastructures such as tunnels and bridges may contribute to the increase in service demands.

## (2) New Reference indexes

Upon rebasing, the Bank will commence the price survey of "Wholesale trade" and "Intellectual properties licensing" as new reference indexes. This aims to strengthen the function of deflators in the SNA in order to respond to the government's statistical reform.<sup>17,18</sup> Refer to Appendix 1 for details on the publication and pricing method of the item "Wholesale trade."<sup>19</sup>

### (Wholesale Services Price Index)

As mentioned in the *Basic Policy* and the *Final Draft*, in Japan's GDP statistics, price indexes of products purchased by wholesalers have been used as the wholesale services deflator. This implies that the percentage change in wholesale purchase price and that of per unit margins are assumed to be equal. However, according to the results from the current survey, the transition of wholesale service price is relatively stable while the price of products purchased by wholesalers is more volatile reflecting changes in resource prices<sup>20</sup> (Chart 17[1]). This suggests that price setting behavior of wholesalers does not necessarily align with the simple assumption described above.

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<sup>16</sup> In April and May 2018, the index soared because prices of several reporting companies rose in response to a tight supply-demand balance.

<sup>17</sup> The real output (real GDP) of individual services is calculated by dividing the nominal output by a corresponding price index (deflator). In this sense, the SPPI is used as a deflator.

<sup>18</sup> The "Basic Policy for the Fundamental Reform of Economic Statistics" formulated by the Council on Economic and Fiscal Policy in December 2016, suggests that the Bank of Japan should introduce wholesale service and patent lending service to the price survey. Of these, the patent lending service corresponds to "Intellectual properties licensing" introduced in this rebasing.

<sup>19</sup> Refer to Research and Statistics Department, Bank of Japan [2018] "Compilation Method of the 'Wholesale Services Price Index' in Japan," *BOJ Reports & Research Papers*, for further details on the price survey.

<sup>20</sup> The purchase price for the wholesaler is calculated as weighted average of price indexes (e.g. CGPI) with the weights of corresponding wholesale margin.

Further data collection is necessary to perform detailed analysis on the trend of "Wholesale Services Price Index." However, the recent rise of "Building materials, minerals & metals, etc." has contributed to the rise in the index of "Wholesale trade" (Chart 17[2]). The rise in the index of "Building materials, minerals & metals, etc." may result from the followings: (1) as for chemical products, some wholesale companies set their selling prices so that margin percentage is almost constant, and the per unit margin (calculated by multiplying the "selling price" by "margin percentage") has increased reflecting the rise in their purchase prices; (2) as for iron and steel, raising the selling price has become somewhat easier due to steady domestic construction demands.

The rise in the index of "All items including Wholesale trade" is somewhat small compared to that of "All items" (except Wholesale trade) (Chart 17[3]). This is because while "All items" in the SPPI is rising due to labor shortage as a whole, the wholesale trade price remains nearly flat.

#### **(Intellectual properties licensing)**

"Intellectual properties licensing" is a service that provides other companies with permission to use the company's intellectual property, for example, patent rights and know-how. The commencement of its price survey corresponds to the rebasing of the SNA conducted in 2016, which introduced the intellectual properties licensing service to the GDP. Due to the small domestic transaction scale, price survey is conducted only for export and import transactions. Particularly for exports, the Bank publishes two items: "Intellectual properties licensing (Transportation equipment)" and "Intellectual properties licensing (except Transportation equipment)," with respect to the large weight of transportation equipment.

The price of intellectual properties licensing is calculated by multiplying the license rate surveyed from reporting companies by a price index corresponding to the product produced. In general, price indexes (yen basis) fluctuate mainly by reflecting the changes in exchange rates and local (where the product was produced) price indexes. Since license rates themselves do not change frequently, the index tends to decline in periods of yen appreciation (Chart 18).

#### **4. Analysis of Rebasing Effects on the Index for "All items"**

As mentioned in Section 3, with regard to the index for "All items," the year-on-year changes in the new index are somewhat higher than those in the old index, mainly from late 2017 through 2018. This section analyzes the factors contributing to this difference between the old and new indexes.

## **4.1. Decomposing the Difference between the Old and New Indexes**

This subsection compares the year-on-year changes in the index for "All items" (except "Wholesale trade") between the old and new indexes from January 2016 through March 2019 and decomposes their difference. In accordance with the type of revisions upon the rebasing, this difference can be decomposed into four factors: (1) item index revision effect; (2) newly added item effect (effect of introducing new items); (3) weight effect (effect of updating weights); and (4) reset effect (effect of resetting the index levels to 100). More specifically, the item index revision effect, the newly added item effect, and the weight effect correspond to the revisions explained in Section 3.2.1., Section 3.2.2., and Section 2.3., respectively.

The results of the decomposition are as follows. For 2016, the difference in the year-on-year changes between the old and new indexes is small (0.01 percentage point). This is because the upward contribution from the item index revision effect and the downward contribution from the reset effect mostly offset each other. After that, mainly from late 2017 through 2018, the difference in the year-on-year changes between the old and new indexes expands positive, mainly due to the item index revision effect. On average from 2017 through 2019, the year-on-year changes in the new index are 0.07 percentage point higher than in the old index (Chart 19). This is a result of the upward contribution from the item index revision effect (0.19 percentage point) and the newly added item effect (0.02 percentage point) exceeding the downward contribution from the weight effect (minus 0.07 percentage point) and the reset effect (minus 0.04 percentage point).<sup>21</sup> Section 4.2. focuses on the difference in year-on-year changes between the old and new index for "All items" from 2017 through 2019 and elaborates on its decomposition into the above four factors.

## **4.2. Details on Each Rebasing Effect**

### **(1) Item index revision effect**

The item index revision effect refers to the impact of revision on the year-on-year changes in the index for "All items" resulting from various reviews on existing items, such as in terms of sample price composition, quality adjustment method, and pricing method of the sample prices. It is notable in this rebasing that the contribution of the item index revision effect is relatively large compared to the other three effects.

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<sup>21</sup> The percentage points in parenthesis here represent annual averages.

Breaking down the item index revision effect, the largest contribution to upward shifts in the year-on-year changes in the index for "All items" for recent years comes from revising the sample price composition in the major groups "Information and communications" and "Advertising services," in response to the advancement of information and communication technologies (digitalization). Specifically, the upward shifts reflect rises in service prices that have been newly incorporated into the subgroup "Internet based services" (particularly in the item "Web portals") and the item "Internet advertising," mainly due to the expanded demand for those services (Chart 20).

The item index revision effect of the major group "Transportation and postal activities" also contributes to the upward shift in the year-on-year changes in the index for "All items" for recent years. Specifically, such upward shifts are the result of the following: (1) an increase in the proportion of services concerning mineral and chemical product transportation, whose prices have risen significantly, in "Motor freight transportation," which has been split into four items upon the rebasing; (2) a revision in the composition of sample prices in terms of types of freight and respondents for the items "Ocean freight transportation (except Ocean tankers)" and "Door-to-door parcel delivery" in order to reflect the actual market composition as of 2015.

Regarding the effect of revising quality adjustment methods, overall it induces only a slight upward shift in the year-on-year changes in the index for "All items." This is a result of almost offsetting the positive and negative contributions mentioned in Section 3. Specifically, the revisions to the items "Voluntary motor vehicle insurance," "Compulsory motor vehicle insurance," and "Television advertising (program sponsorships)" have been contributing to push up the year-on-year changes from 2016 onward, whereas the revision of the item "Newspaper advertising" contributes to push down the year-on-year changes for recent years.

## **(2) Newly added item effect**

The newly added item effect refers to the effect of introducing new items on the year-on-year changes in the index for "All items."<sup>22,23</sup> Among the newly added items,

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<sup>22</sup> The newly added item effect does not include the effect due to splitting or consolidating items. For the items that are split or consolidated, the Bank, as is the case with the existing items, decomposes the difference in the year-on-year changes between the old and new indexes for "All item" into the three effects: the weight effect; the reset effect; and the item index revision effect. This is done by rearranging the classification in the old index so as to retain consistency with that in the new index.

<sup>23</sup> For the following four newly added items, the contribution of the newly added item effect is calculated using the same definition as that in the item index revision effect applied to the existing items: "Financial product and commodity exchange services"; "Liability insurance"; "Real estate

price rises of services in the items "Real estate agency and management services" and "Non-destructive testing services" contribute to pushing up the year-on-year changes in the index for "All items" in many periods (Chart 21). In this rebasing, however, the contribution of the newly added item effect as a whole is small relative to the other three effects. This is partly because price movements in the newly added items other than the above two items are not necessarily significant.

### (3) Weight effect and reset effect

The weight effect refers to the effect of changes in item weights from the old index to the new index.<sup>24</sup> Supposing that the weight of an item increases (decreases), in the new index, the contribution of the year-on-year changes of the item to those of the "All items" becomes larger (smaller) in absolute value, relative to in the old index. The reset effect refers to the effect of resetting the index levels for individual items to 100 for the new base period. Supposing that the index level of an item has declined (risen) from 100 in the old index, this item's index level is pushed up (pushed down) to 100 in the new index and the contribution of the year-on-year changes of the item to those of the "All items" becomes larger (smaller) in absolute value, relative to in the old index.

Breaking down the above effects, the negative weight effect of the subgroup "Internet based services" is remarkable (Chart 22). This is because the item "Web portals," whose price has declined since 2017 in the old index, has increased its weight due to expanded demand. The items "Newspaper advertising" and "Motor freight transportation" also exhibit negative weight effect. This is because these items, while having risen in the old index, decrease in weight mainly due to declined transaction volumes in the new index. As for services relating to construction and restoration demand, such as the subgroup "Civil engineering and architectural services" and the item "Temporary material rental,"

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agency and management services"; and "Television program production" (Chart 19). For example, in the old index, prices of "Real estate agency and management services" are not surveyed, but the weight of the major group "Real estate services" is calculated on the basis that "Real estate agency and management services" is included. This means that, in the old index, price developments of "Real estate agency and management services" are assumed to equal those in the group "Real estate rental" in calculating the index for "All items." Given this point, the newly added item effect of "Real estate agency and management services" is calculated as the difference in price developments between "Real estate agency and management services" in the new index and "Real estate rental" in the old index. On the other hand, with respect to the newly added items "Non-destructive testing services" and "Health and hygiene," the weights of the corresponding services are not included at all for the calculation of "All items" in the old index. Hence, the newly added item effects of these services are calculated as equal to the contributions of these services to the year-on-year changes in the index for "All item" in the new index, on the assumption that those contributions in the old index equal zero.

<sup>24</sup> The weight effect includes the effect due to deleting the item "Private broadcasting."

the weight effect makes a positive contribution whereas the reset effect makes a negative contribution. The positive weight effect of these services is attributable to their prices having seen rises in the old index, as well as the increased weights of the corresponding items due to expanded demand in the new index. The negative reset effect is due to the reduced contribution of price rises of these services to the year-on-year changes in the index for "All items," as the index levels for these subgroup/item, which had been at high levels in the old index, have been reset to 100 for 2015.

## **5. Closing Remarks**

Upon this rebasing, the Bank received considerable cooperation from survey respondents, academics and economists as well as the government and industrial associations, who offered comments on the *Basic Policy*. The Bank would like to express its sincere gratitude to those who were kind enough to make such contributions.

The Bank will continue its efforts to improve its price indexes, even at rebasing intervals, through the replacement of sample prices and continual review of pricing methods and quality adjustment methods. The Bank would like to ask for the continued support of individuals and organizations and for their ongoing cooperation by providing opinions and comments on the Bank's statistics compilation.

## **Appendix 1. Publication and Survey Method of the Wholesale Services Price Index**

This Appendix explains the publication and survey method of the "Wholesale Services Price Index" which is to be newly published from the 2015 base SPPI.

### **(1) Publication**

The Wholesale Services Price Index is published on a quarterly basis (late February, late May, late August and late November), which corresponds with the publication of the SPPI. It should be noticed that the reference periods of publication are different between Wholesale Services Price Index and items except Wholesale Services Price Index (published monthly). On the release day in August, for example, preliminary indexes of July and the revised indexes of June are published for items except the Wholesale Services Price Index while preliminary indexes of April-June quarter and the revised indexes of January-March quarter are published for the Wholesale Services Price Index (Appendix Chart 1[1]). More time is needed before publication of the Wholesale Services Price Index in order to sufficiently reflect accounting information processed on a quarterly basis used by many respondents, at the timing of preliminary release.

The Wholesale Services Price Index is published quarterly, so that it is not included in "All items" of the SPPI which is published monthly. On the timing of publication of the Wholesale Services Price Index, however, the index of "All items including Wholesale trade" is also published in order to capture the price developments of all services to businesses including Wholesale trade (Appendix Chart 1[2]). As with the Wholesale Services Price Index, "All items including Wholesale trade" is a quarterly index, so for example, the preliminary index for April-June quarter is published on the release date in August. In addition, five subsector indexes are scheduled to be published in the Wholesale Services Price Index.

### **(2) Survey method**

The definition of the price for wholesale service is "a price for a wholesale service per unit of goods wholesaled (per unit margin)" (Appendix Chart 1[3]). This price is derived from the following three methods: (1) by the difference between the reported "unit selling price" and the "unit purchase price" for a product; (2) by multiplying the reported "unit selling price" by "margin percentage"; (3) by multiplying the reported "margin percentage" by the price index corresponding to the goods wholesaled.<sup>25</sup>

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<sup>25</sup> The Corporate Goods Price Index is available as the price index corresponding to goods

Among the three above, the one that fits in terms of pricing method and data management system adopted by each respondent is selected. The most adopted method is (1), which accounts for about 60 percent of the total (Appendix Chart 1[4]).

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wholesaled. In a precise sense, "mark-up percentage ( $=\text{margin percentage}/(1-\text{margin percentage})$ )" is used instead of "margin percentage" because the Corporate Goods Price Index conceptually corresponds to purchase price for wholesalers.

## Appendix 2. Quality Adjustment Methods Applied to Advertising

The Bank has revised its quality adjustment methods concerning two items, "Newspaper advertising" and "Television advertising (program sponsorships)." These revisions are outlined below.

### (1) Newspaper advertising

In the old index, the Bank used the "column price per copy" for newspaper advertising, which is calculated by dividing "column price (price per column)" by "the number of copies sold," where data on "column price (price per column)" and "the number of copies sold" have been collected from respondents and the Japan Audit Bureau of Circulations, respectively. This method was based on the observation that the column price is almost proportional to the number of copies sold.<sup>26</sup>

In the course of this rebasing, however, relevant experts pointed out the possibility that recent developments in digital technology have influenced the relationship between the column price and the number of copies sold.

First, along with the developments in digital technology, the way in which companies think about advertising in newspapers may have changed. Companies that expect a direct response from customers have increased their internet advertisements. On the other hand, many companies that choose newspaper advertising over internet advertising, value the long-term benefits of newspaper advertising, such as the improvement of their corporate image by advertisement placement in established media, i.e., the newspaper, itself.<sup>27</sup> As these "selective usages" of advertising media prevail, it can be said that, other factors that cannot be evaluated by the number of copies sold have become more important among the factors comprising the quality of newspaper advertising.

Second, widespread electronic versions of newspapers may have also changed the relationship between the number of copies sold and the quality of newspaper advertising. Advertisements placed in the paper, in most cases, can be viewed via its electronic version that displays a replication of the newspaper's image as-is (the so-called paper

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<sup>26</sup> For further details, see Research and Statistics Department, Bank of Japan [2014] "Final Draft of Rebasing the Services Producer Price Index to the Base Year 2010," *BOJ Reports & Research Papers* (in Japanese).

<sup>27</sup> Companies may place advertisements in newspapers, intending to enhance their corporate image to job-hunting students. In this situation, companies put emphasis more on the improvement of their corporate image than on the number of advertising viewers.

viewer).<sup>28</sup> On the other hand, "the number of copies sold" used to calculate the price index is only the sum of the paper copies sold. Thus, in the situation where the number of electronic newspaper readers has been increasing, the quality of newspaper advertising (the number of newspaper readers) has not deteriorated as the number of paper copies sold has decreased.

### **(Compilation method in the new index)**

Considering these recent changes, the continuation of adopting "column price per copy" as sample prices may overestimate the impact of the change of copies sold on the quality of newspaper advertising.

Using actual data, it is confirmed that the impact on the "price of newspaper advertising (column price)" of "an increase of newspaper readers" has been smaller recently (Appendix Chart 2[1]). In particular, while a 1 percent increase (decrease) in copies sold led proportionally to about a 1 percent increase (decrease) in the price of newspaper advertising before 2015, the same increase (decrease) in copies sold leads to only about a 0.38 percent increase (decrease) in price after 2015. This result implies that in recent years, the effect of newspaper advertising has not declined as the number of copies sold has decreased.

In the new index, using this regression result, the Bank introduces a new quality adjustment method concerning newspaper advertising. This new method employs a statistical technique called the Hedonic approach. The "pure price change" is calculated by eliminating the effect due to the change of the copies sold, on the assumption that a 1 percent change in copies sold leads to a 0.38 percent change in the quality of advertising. The Bank will periodically update the regression and review its parameters if necessary since these parameters may not be stable in the future.

### **(2) Television advertising (program sponsorship)**

Since the effect (quality) of television advertising increases as the number of viewers increases, it is possible to apply the quality adjustment using "Gross Rating Point (GRP)."<sup>29,30</sup> As for television advertising associated with the sponsorship of a particular

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<sup>28</sup> Banner advertising displayed on newspaper websites is categorized into "Internet advertising," not "Newspaper advertising."

<sup>29</sup> Gross Rating Point (GRP) is equal to the sum of the product of "the airtime of TV commercials (1 unit is 15 seconds)" and "the viewer rating." The 1 GRP indicates that a TV commercial goes on the air for 15 seconds with 1 percent viewer rating.

<sup>30</sup> As for the item "Television advertising (spot advertising)" which is not associated with sponsorship of a particular program and is mainly broadcast between TV programs, the Bank uses

program, however, the sponsor again puts great value on the improvement of its corporate image, that is, it is expected that sponsoring a TV program itself pushes up the corporate image. Thus, using "price per GRP" when calculating the item index for "Television advertising (program sponsorship)" may over-adjust the impact of viewer rating on the quality of the advertising. From this standpoint, in the old index, the Bank has used "price per airtime" as sample prices and has not introduced the quality adjustment method using the viewer rating. This implies that using "price per airtime" is based on the slightly strong assumption that fees for "Television advertising (program sponsorship)" is determined without considering the change in the viewer rating.

### **(Compilation method in the new index)**

In the new index, as is the case with newspaper advertising, the quality adjustment method, that "partially" adjusts the effect of change in the number of viewers, is introduced to the new index for "Television advertising (program sponsorship)." The Bank introduces this new method because the rise in viewer rating can be considered to increase to some extent the quality of advertising, albeit not proportionally.

The validation result on actual data indicates that price of "Television advertising (program sponsorship)" increases as the viewer rating does with statistical significance; a 1 percent increase in viewer rating (e.g. increase in viewer rating from 10.0 percent to 10.1 percent) leads to a 0.28 percent increase in price of the advertising (Appendix Chart 2[2]). In the new index, using this regression result, the price index for "Television advertising (program sponsorship)" is calculated by estimating "pure price change," eliminating the effect of the change in viewer rating.

### **(3) Quality adjustment methods applied to other advertising services**

Although "price per view" is used in principle as the quality adjustment method in the group "Advertising services" in the 2015 base index, other various quality adjustment methods are also adopted (Appendix Chart 2[3]).

The Bank believes that an introduction of suitable quality adjustment methods along with trade practice or purpose of each advertising service will improve the index accuracy.

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"price per GRP" as sample prices on the assumption that the quality of the service is directly proportional to GRP. This method is consistent with business practice that GRP is an important factor in price negotiation of spot advertising and advertising expenses are determined by the product of "price per GRP" and "GRP."

### Appendix 3. Quality Adjustment Methods Applied to Property and casualty insurance services

From the 2015 base, the Bank starts to compile the price index of "Property and casualty insurance services" in which the change in risk amount is taken into account. In particular, in accordance with expert advice, the method of calculating two items — "Compulsory motor vehicle insurance" and "Voluntary motor vehicle insurance," is changed as explained below.

#### (1) Concept of quality adjustment

The quality of insurance services may change according to a change in its risk amount. For instance, a reduction in automobile insurance premium resulting from a lower probability of accidents due to the improvement of safety features in automobiles, can be considered the result of quality changes in insurance services associated with lower risk amounts. In this case, it is preferable to subtract the value of the quality change from changes in prices when compiling the price index.

Conceptually, the quality adjustment for insurance services can be conducted by subtracting the change in "net premium" from that in gross premium (see Appendix Chart 3[1]). Here the net premium, which is comparable to claims paid by insurance companies from gross premium, varies depending on changes in the risk amount. On the other hand, the "expense loading" obtained by subtracting net premium from gross premium, is allotted to insurance companies' running costs etc. The change in this expense loading is, in principle, viewed as "pure price change" that is not affected by the change in risk amount.

Specifically, the "pure price change" from period t-1 to t is obtained by subtracting the value of the quality change from changes in prices, using the following formula. For instance, when the net premium ratio (the ratio of net premium to gross premium) rises with gross premium unchanged, insurance covering higher risk can be purchased at the same price as the one covering lower risk, leading to a decline in the price index.

$$\begin{aligned} \text{Pure price change}_t &= \text{change in gross premium}_t - \text{change in net premium}_t \\ &= (1 - \text{net premium ratio}_t) \times \text{gross premium}_t - (1 - \text{net premium ratio}_{t-1}) \times \text{gross premium}_{t-1} \end{aligned}$$

The quality adjustment method above is to be introduced in the new index for two items — "Compulsory motor vehicle insurance" and "Voluntary motor vehicle insurance" since appropriate proxy variables for the net premium are available (Appendix Chart 3[2]).

## (2) Quality adjustment methods for motor vehicle insurance

The premium in compulsory motor vehicle insurance is determined based on the "standard rate" published by the General Insurance Rating Organization of Japan (GIROJ). This "standard rate" is also used for sample prices in the item "Compulsory motor vehicle insurance" in the SPPI. In the new index, when the premium in compulsory motor vehicle insurance is revised, the quality adjustment is performed by calculating the change in net premium using the net premium ratio (=net premium/standard rate) before and after revision.<sup>31</sup>

On the other hand, the quality adjustment for the item "Voluntary motor vehicle insurance" is performed using the actual loss ratio obtained from financial statements as a proxy variable for the net premium ratio.<sup>32</sup> This adjustment is conducted every January using the actual loss ratio of the previous fiscal year. For instance, at the time of revising the January 2017 premium rate, the adjustment is performed assuming that the net premium ratio after revision coincides with the actual loss ratio of fiscal year 2015 (from April 2015 to March 2016). Although each insurance company does not necessarily recognize and determine the risk amount from the actual loss ratio in the previous fiscal year, it is conceivable that the above method can capture the trend changes in the net premium ratio.

As a result of introducing the quality adjustment described above, both indexes for "Compulsory motor vehicle insurance" and "Voluntary motor vehicle insurance" shift somewhat upward compared to the old indexes (Chart 10). This is because the effects of the decrease in accident rates (decrease in insurance risk) due to improvements in safety features of automobiles are excluded from the movement of the premium.

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<sup>31</sup> The GIROJ examines whether the standard rates for compulsory insurance are appropriate levels and reports to the Financial Services Agency (FSA) every fiscal year. The results of examination are discussed at the FSA's Compulsory Insurance Council around January each year. If necessary, the standard rates are revised and applied normally from April of that year.

<sup>32</sup> The average of "incurred to earned basis loss ratio (IE loss ratio)" of insurance companies is used as actual loss ratio. The IE loss ratio is one of the data used for calculating the premium in property and casualty insurance, which is calculated as follows:

$$\text{IE loss ratio} = \frac{\text{Claims paid in current term} + \text{Claims unpaid in current term} - \text{Claims unpaid in previous term}}{\text{Earned premium}}$$

When calculating the denominator, it is assumed that each year the insurance contract starts from the middle of a year. This data is taken from *"The Statistics of Japanese Non-Life Insurance Business,"* published by Hoken Kenkyujo Ltd.

Note that "written basis loss ratio," which is calculated by claims paid in the current term divided by premium income in the current term, is a simpler method than "IE loss ratio." However, IE loss ratio where the premium in each term corresponds with the period in which the loss insurance covers occurred, is regarded to be more appropriate in recognizing the insurance risk.

### **(3) Other items in Property and casualty insurance services**

Due to the limitation of data capturing the change in risk amount, the quality adjustment is not applied to items regarding property and casualty insurance services except motor vehicle insurance ("Fire insurance," "Marine and other transportation insurance" and "Liability insurance"). For instance, in the case of fire insurance, where unpredictable payments resulting from natural disasters increase, the ex-post loss ratio tends to differ substantially from assumed risk amount. Taking this into account, the application of a quality adjustment method using actual loss ratio, is limited to the items such as motor vehicle insurance where the Law of Large Numbers is applicable and the actual loss ratio can be a proxy variable for risk amount.

## Charts

- Chart 1 Coverage and Number of the Sample Prices of the 2015 Base Index
- Chart 2 Number of Items of the 2015 Base Index
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- Chart 11 Revised Existing Items (6) : Passenger transportation
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- Chart 22 Weight Effect and Reset Effect

Appendix Chart 1 Publication and Pricing Method of the Wholesale Services Price Index

Appendix Chart 2 Quality Adjustment Methods Applied to Advertising Services

Appendix Chart 3 Quality Adjustment Methods Applied to Property and Casualty Insurance

Reference 1 Breakdown of the Revision and Removal of Items

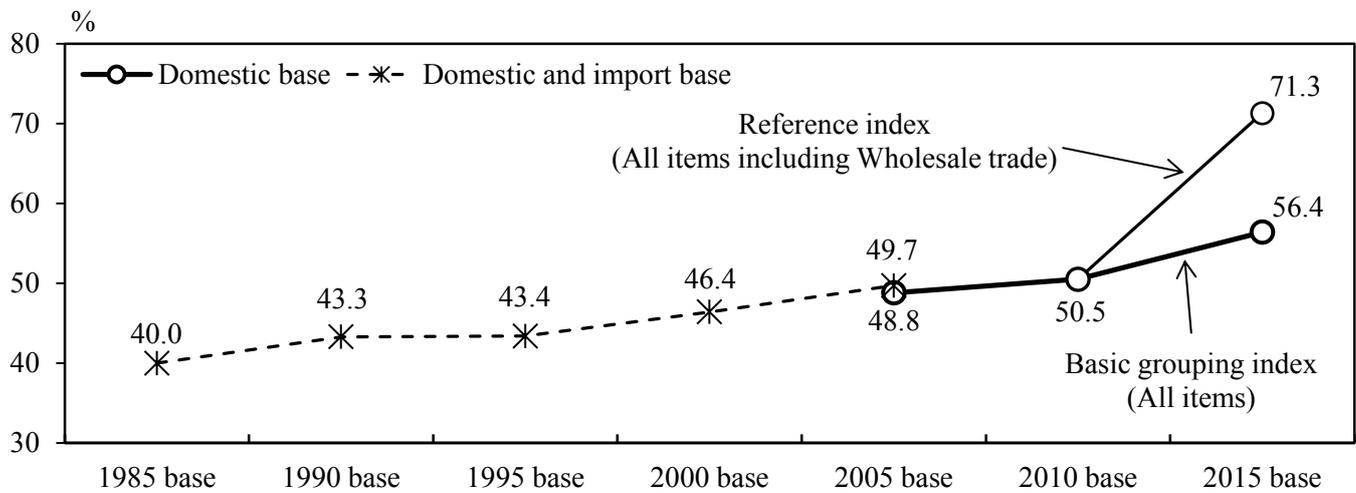
Reference 2 Classification and Weights

## Coverage and Number of the Sample Prices of the 2015 Base Index

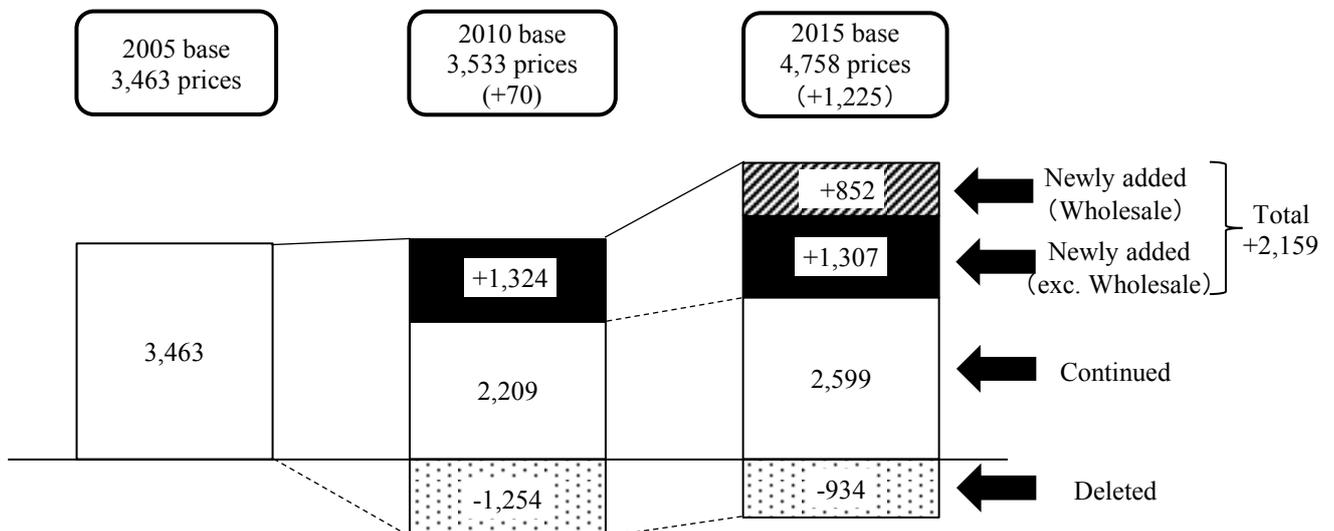
### (1) Total Transaction Value Used in the Calculation of Weights

		2015 base Basic grouping index	2015 base All items including Wholesale trade	<Reference> 2010 base
Total transaction value of business-to-business services	(A)	220.0 tril.yen	220.0 tril.yen	205.9 tril.yen
Total transaction value used in the calculation of weights	(B)	136.5 tril.yen	169.2 tril.yen	119.1 tril.yen
Transaction value of business-to-business services selected in the SPPI	(C)	124.1 tril.yen	156.8 tril.yen	103.9 tril.yen
Coverage	(C/A)	56.4%	71.3%	50.5%

### (2) Changes in Coverage



### (3) Number of Sample Prices



Note: Number of sample prices in (3) includes Reference indexes.

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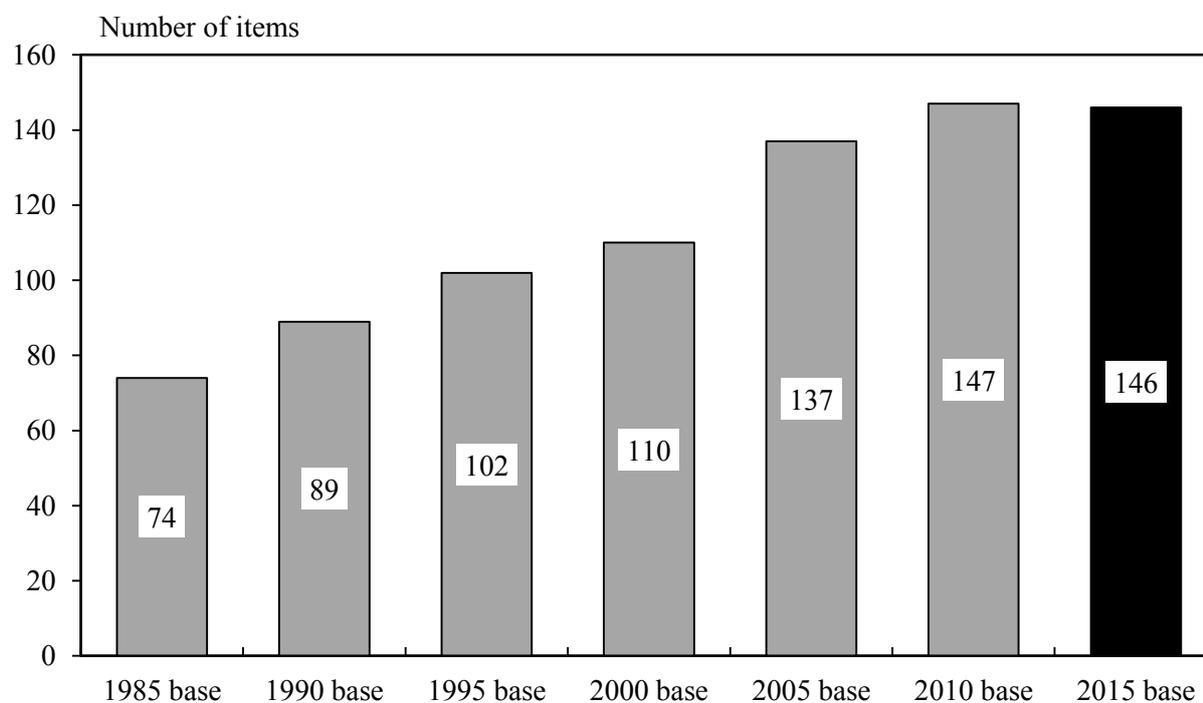
## Number of Items of the 2015 Base Index

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### (1) Number of Items

2015 base (a)	2010 base (b)	Changes in the number of items(a-b)				
		Newly added	Split	Deleted	Consolidated	
146	147	-1	6	5	-1	-11

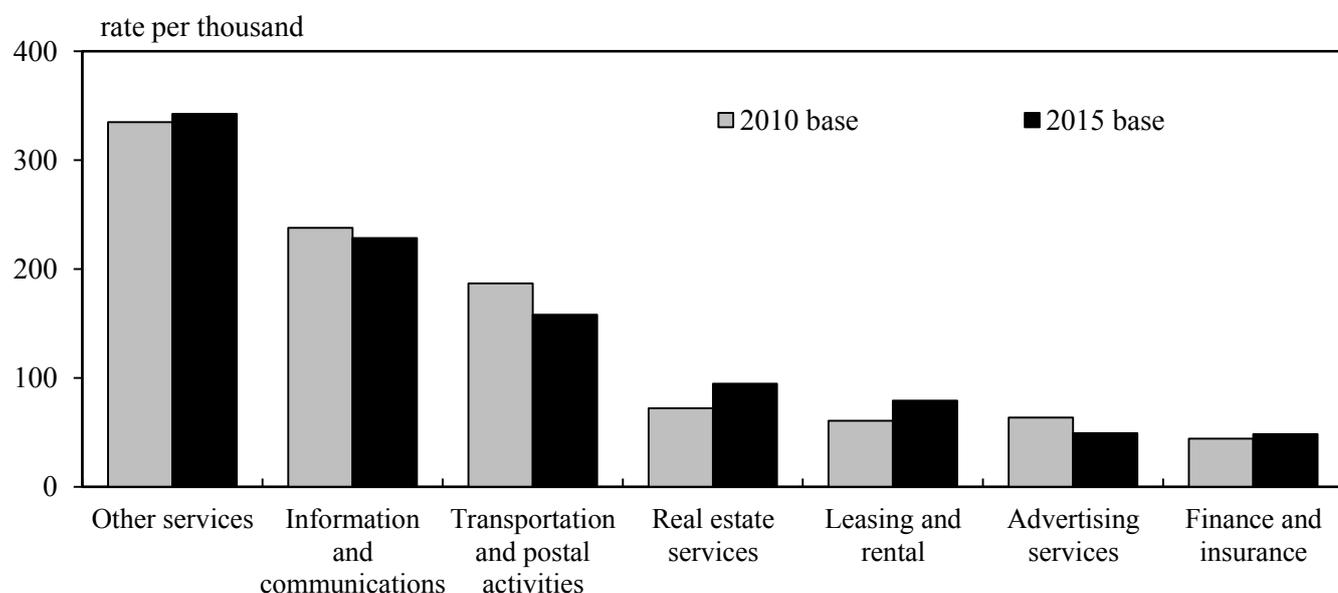
### (2) Changes in the Number of Items



Note: The number of items is based on the Basic grouping index.

## Changes in Weights

### (1) Weights of Major groups (Comparison of 2015 base and 2010 base)



### (2) Examples of Weights Change in Items

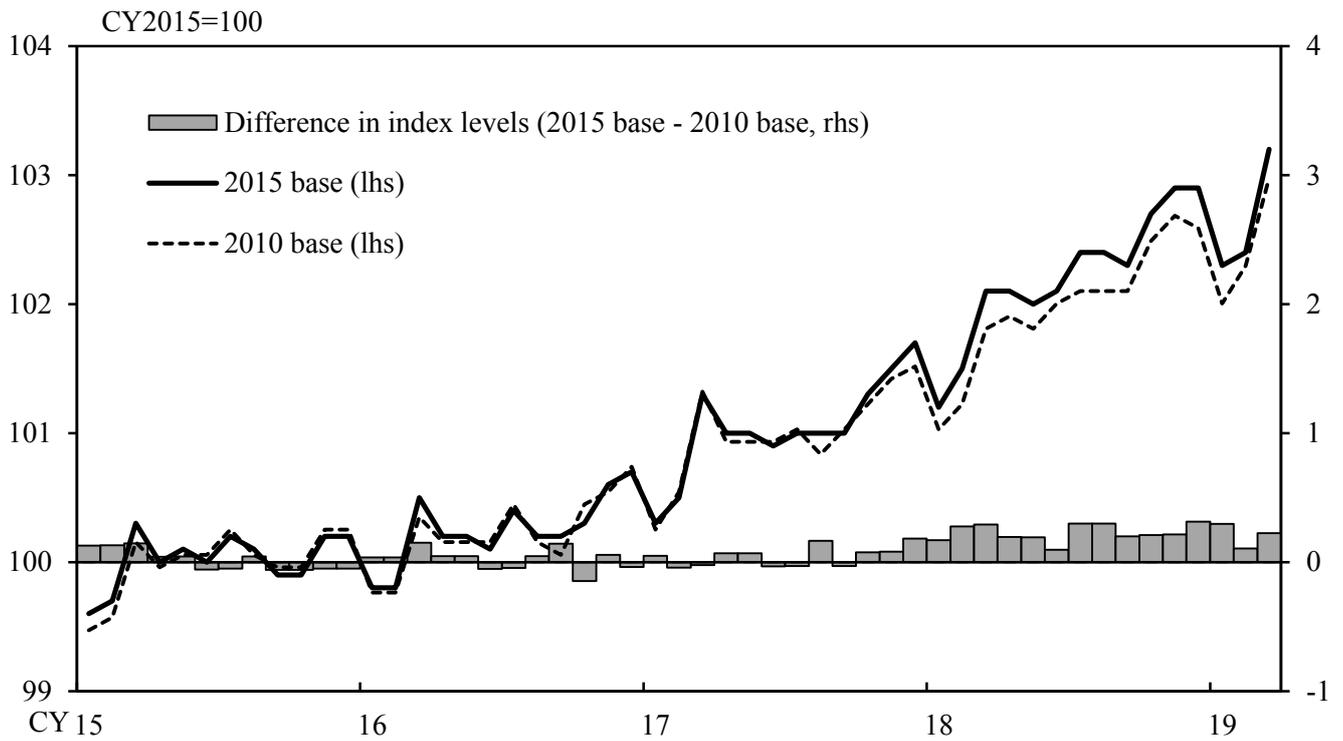
Item	2010 base	2015 base	Difference
<b>Internet related</b>			
Web portals	9.2	14.3	+9.2
Internet support services		4.1	
Internet advertising	6.8	10.9	+4.1
<b>Construction, Restoration, Infrastructure related</b>			
Construction machinery and equipment rental	4.5	11.7	+7.2
Temporary material rental	2.8	6.9	+4.1
Architectural design services	8.7	13.1	+4.4
Civil engineering design services	7.6	11.2	+3.6
<b>Others (Items whose weights decreased)</b>			
Database provision services	12.3	5.7	-6.6
Fixed telephone services	14.9	9.3	-5.6
Newspaper advertising	8.7	4.1	-4.6

Notes: 1. Weights are shown as the rate per thousand (All items = 1,000).

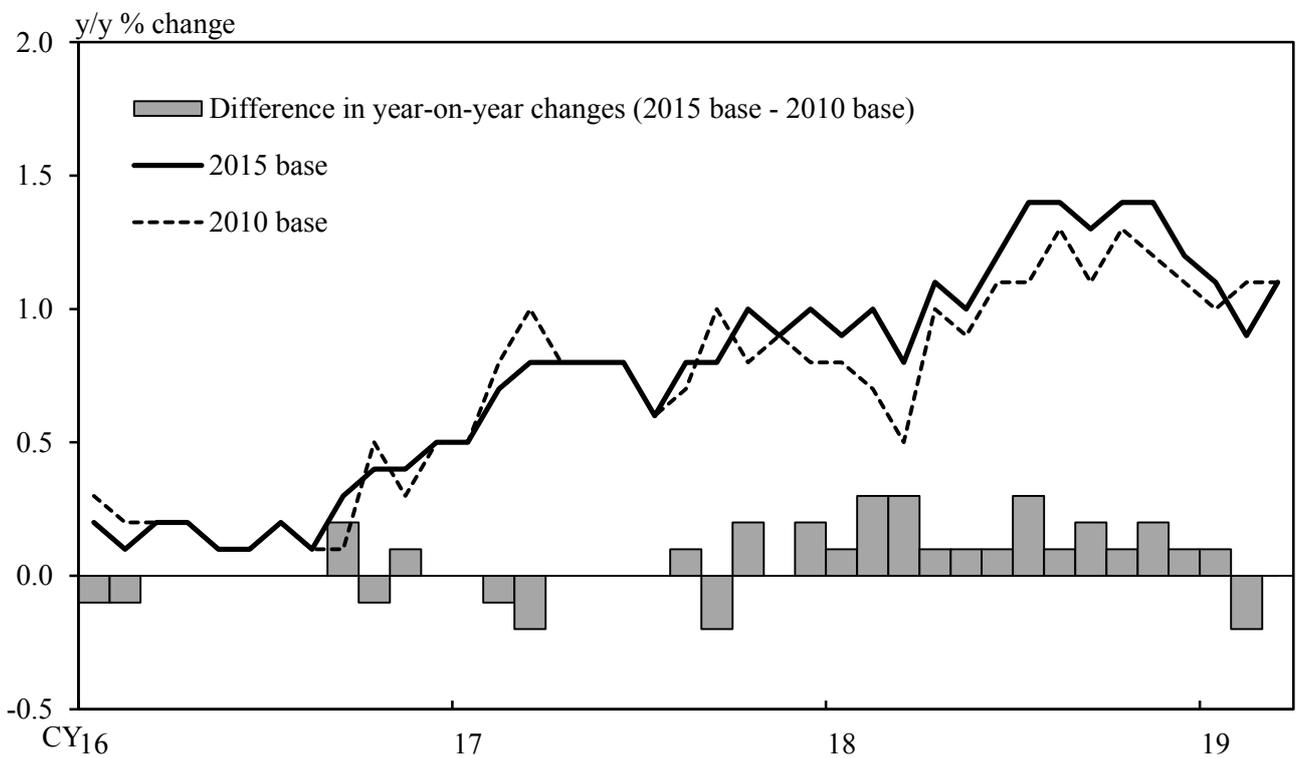
2. Changes in item weights in (2) are affected to some extent by changes of basic statistics used for weights calculation, etc.

## Comparison of the Old and New Indexes

(1) Level

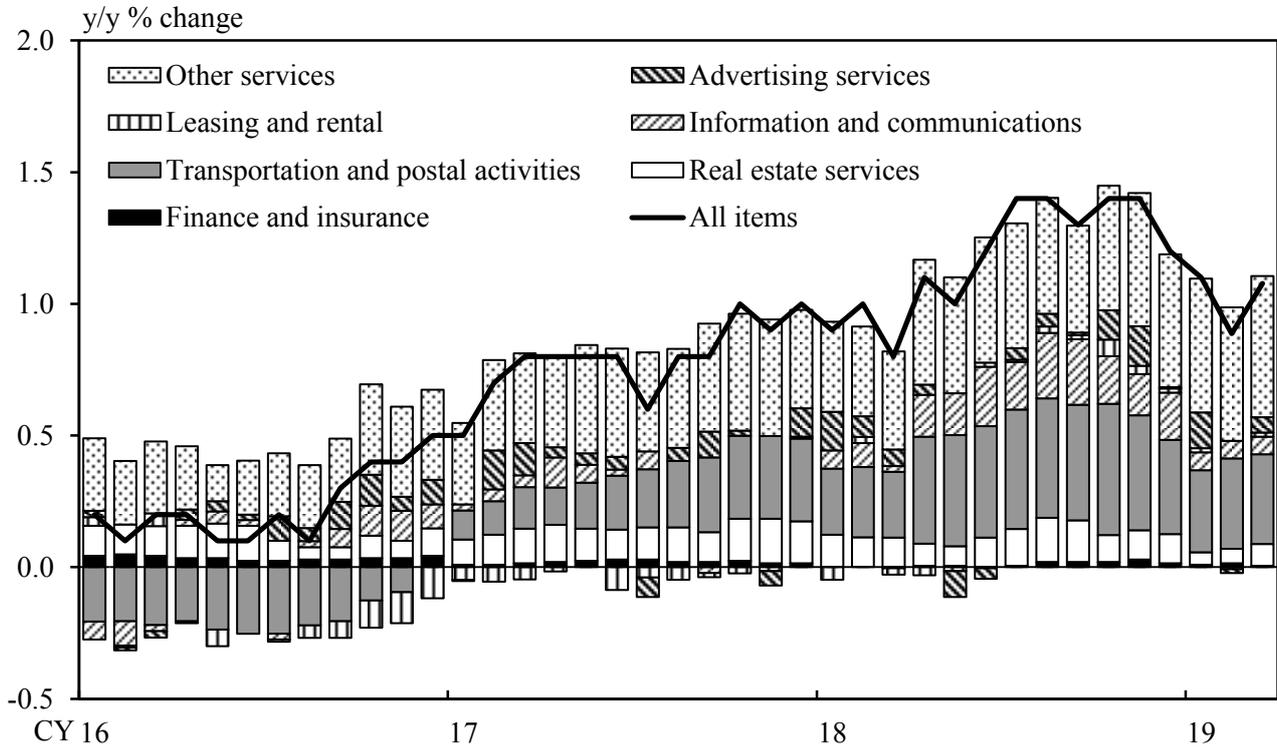


(2) Year-on-Year Change

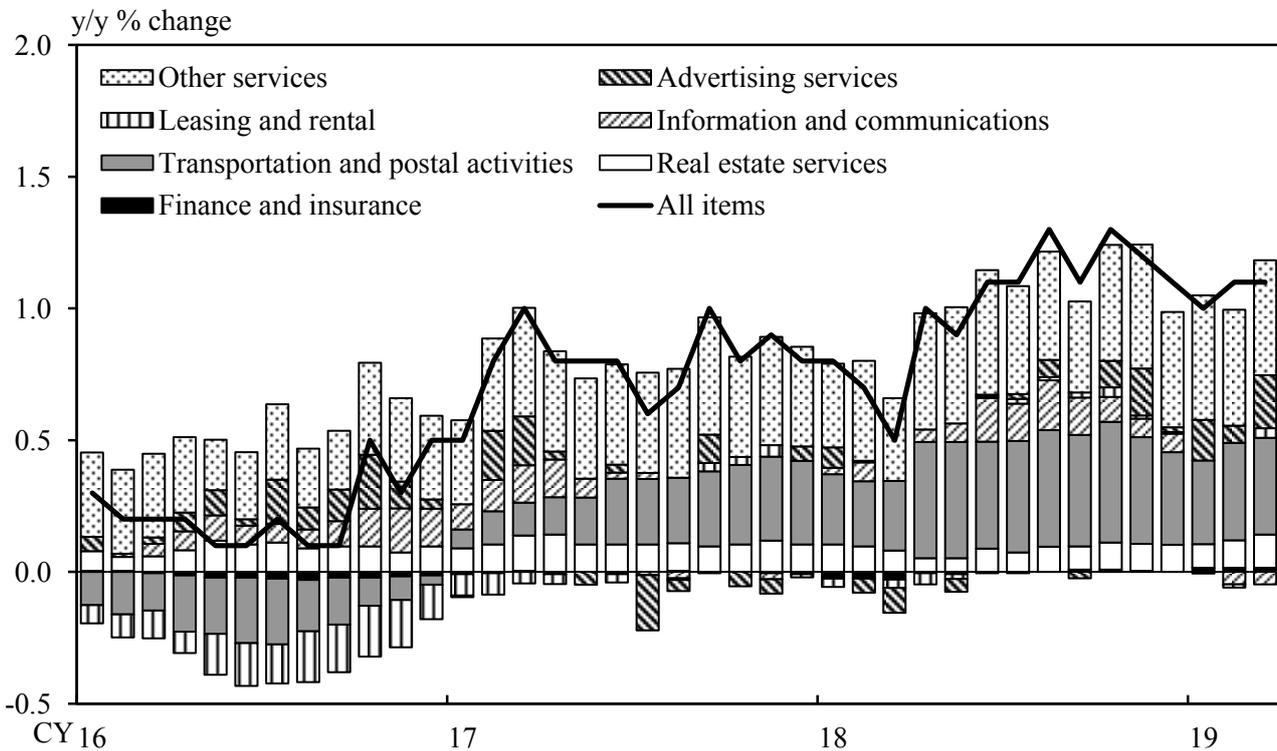


## Decomposition of Year-on-Year Change of the Old and New Indexes

(1) Decomposition of Year-on-Year Change : 2015 base



(2) Decomposition of Year-on-Year Change : 2010 base



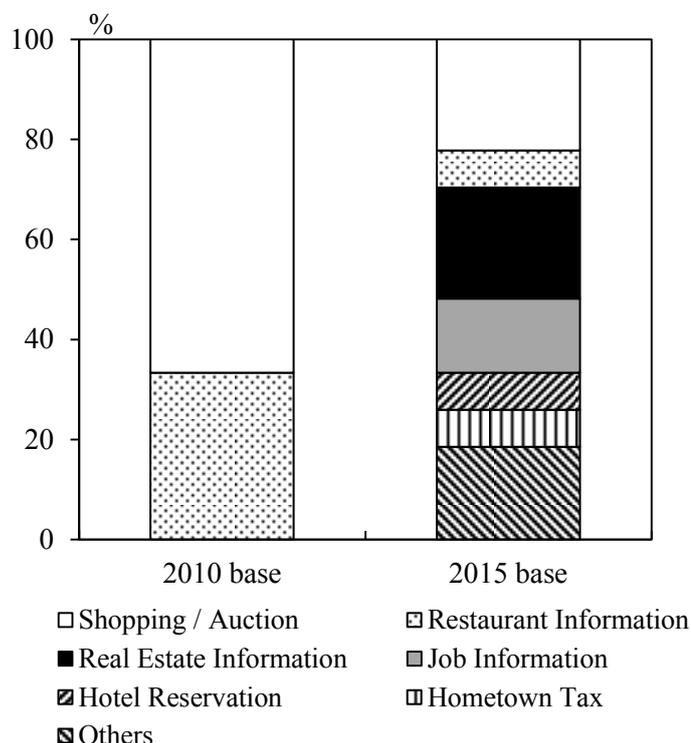
Note: The value of All items does not necessarily match the sum of each breakdown due to rounding.

## Revised Existing Items (1) : Internet based services

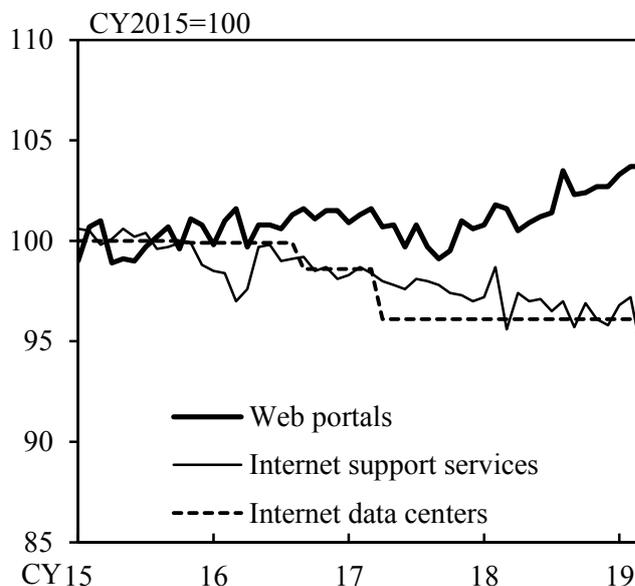
-- Reflection of the Changes in Economic and Industrial Structures --

(1) Composition of Sample Prices

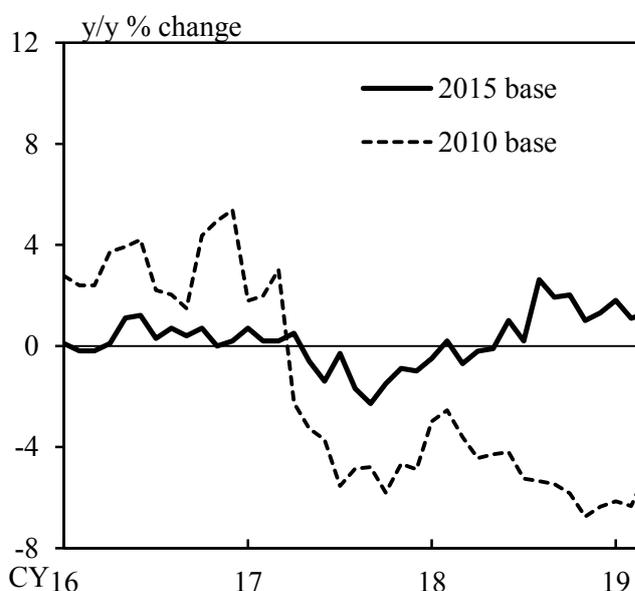
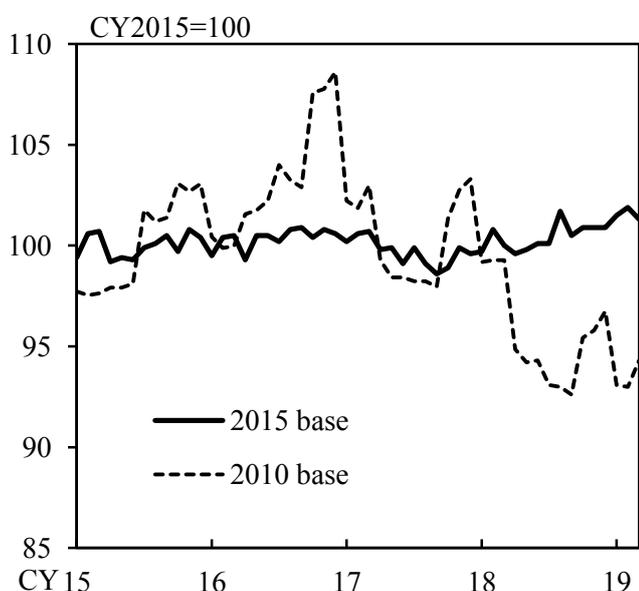
-- Web portals --



(2) Price Indexes : 2015 base



(3) Internet based services



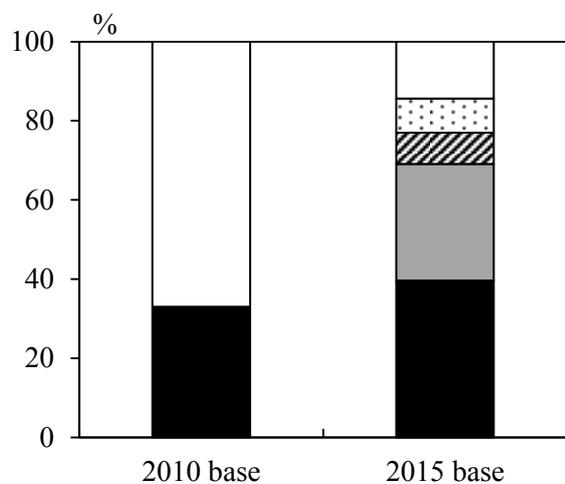
Note : The 2010 base index for "Internet based services" is compiled by consolidating the subgroup "Internet based services" and the item "Internet data centers."

## Revised Existing Items (2) : Internet advertising

-- Reflection of the Changes in Economic and Industrial Structures --

(1) Composition of Sample Prices

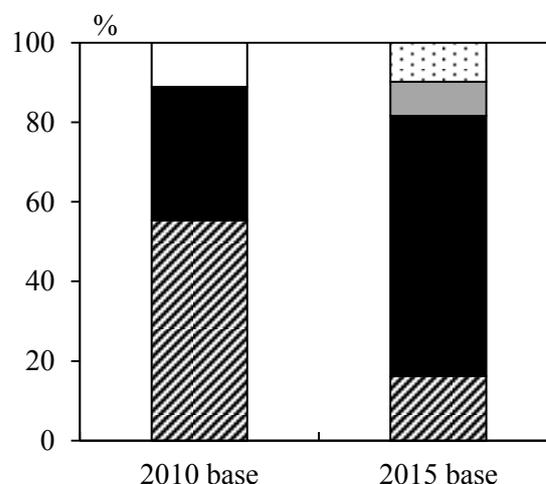
-- By Type of Advertising --



- Reservation Advertising
- Affiliate Advertising
- ▨ Programmatic Advertising (Video Ad)
- ▩ Programmatic Advertising (Display Ad)
- Programmatic Advertising (Listing Ad)

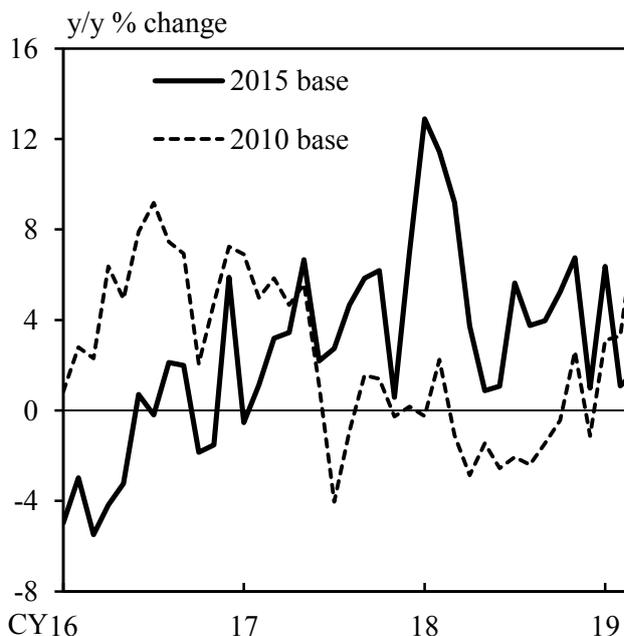
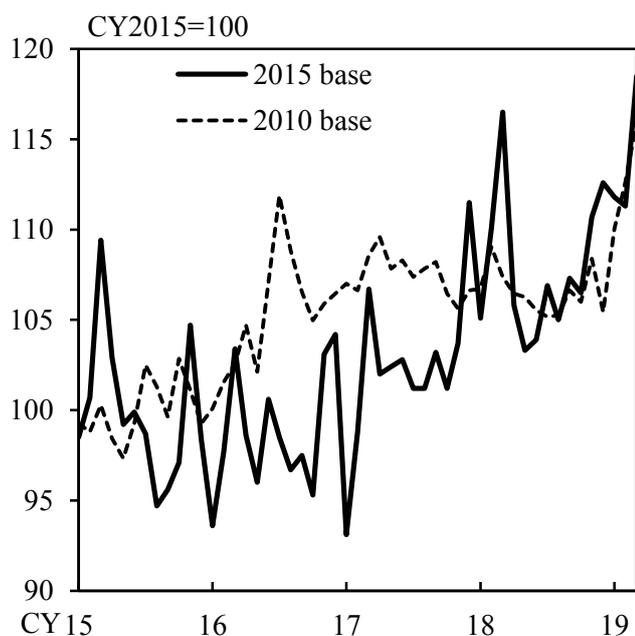
(2) Composition of Sample Prices

-- By Unit of Sample Prices --



- Others
- Per View (for Video Ad)
- ▩ Per Conversion
- Per Click
- ▨ Per Impression

(3) Internet advertising



Notes: 1. Among the Programmatic Advertisings in (1), "Listing Advertising" displays an advertisement on the search screen linked to the keyword searched by the user. "Display Advertising" and "Video Advertising," which are based on the content of website and the user's browsing history, etc., display an advertisement whose effect is assumed to be high. As breakdown of "Reservation Advertising," the Bank surveys display advertising, video advertising, etc.

2. "Others" in (2) is delivery-guaranteed email advertisements.

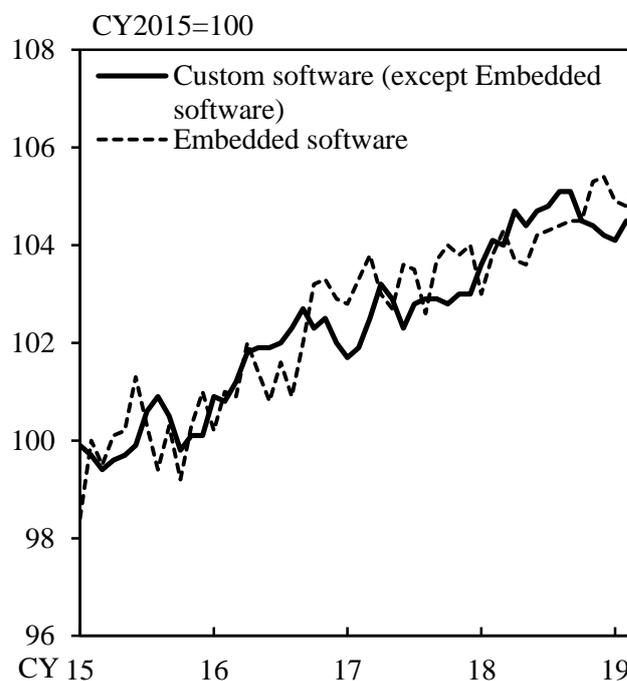
## Revised Existing Items (3) : Custom software

-- Reflection of the Changes in Economic and Industrial Structure --

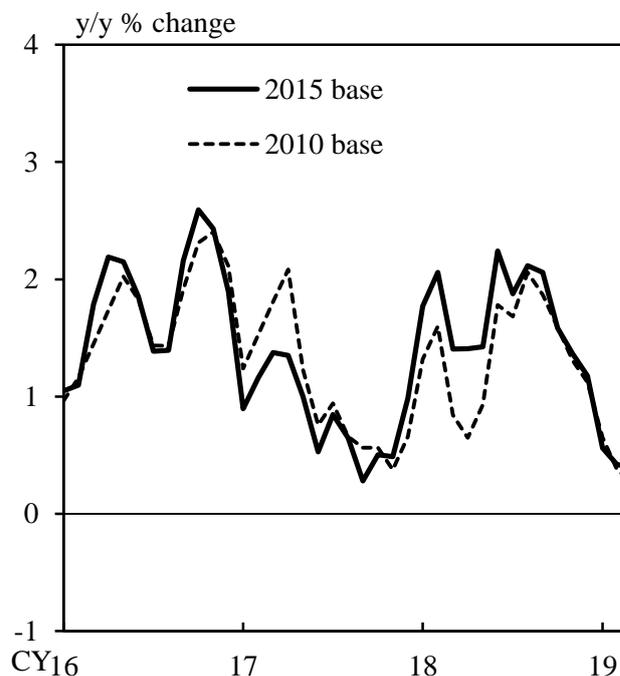
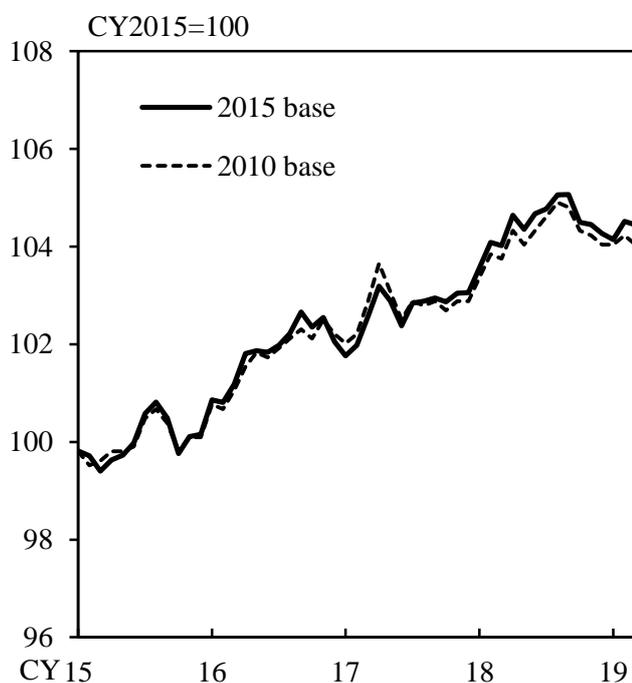
(1) Examples of Newly Added  
"Embedded software"

Automotive and IoT related systems	Advanced driving support systems e.g. information sharing and vehicle control
	Communication infrastructure and security systems for connected car
	Systems that acquire and manage road traffic information from vehicle sensors etc.
	Information communication and transportation infrastructure system with IC cards
Others	Control software embedded in air conditioners
	Sales management systems embedded in cash registers at convenience store

(2) Price Indexes : 2015 base



(3) Custom software

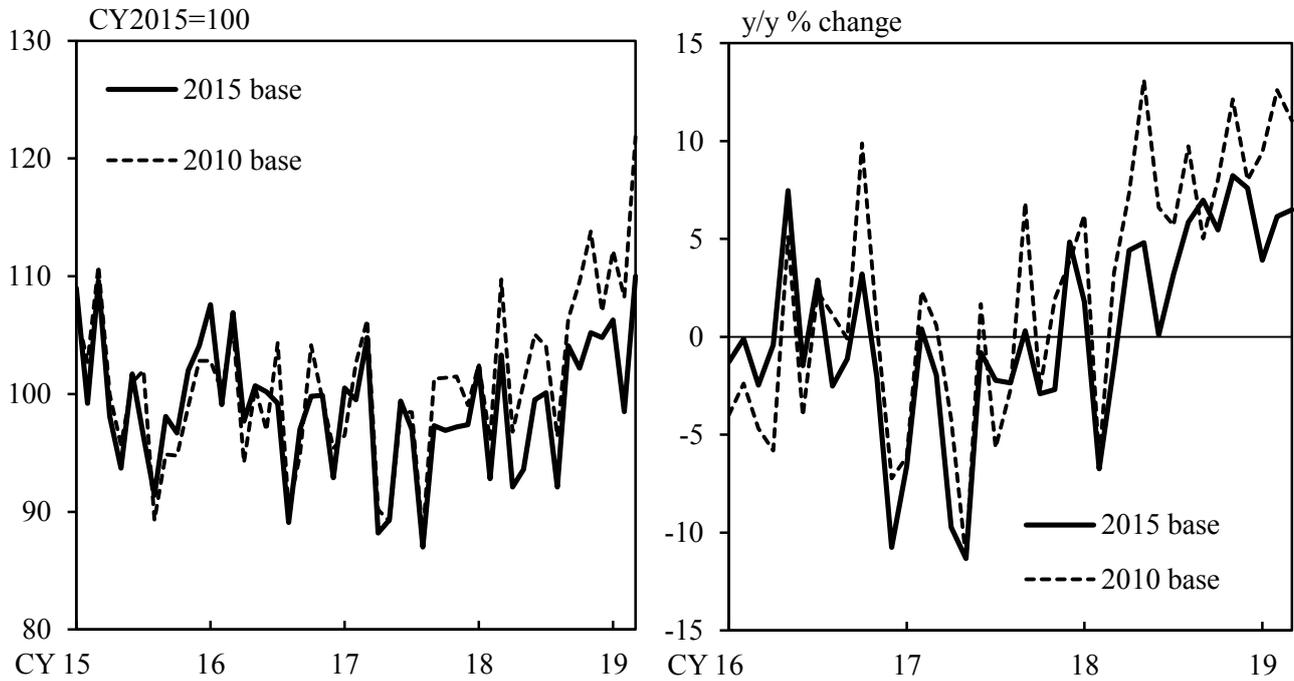


Note : The 2015 base index for "Custom software" is compiled by consolidating the items "Custom software (except Embedded software)" and "Embedded software."

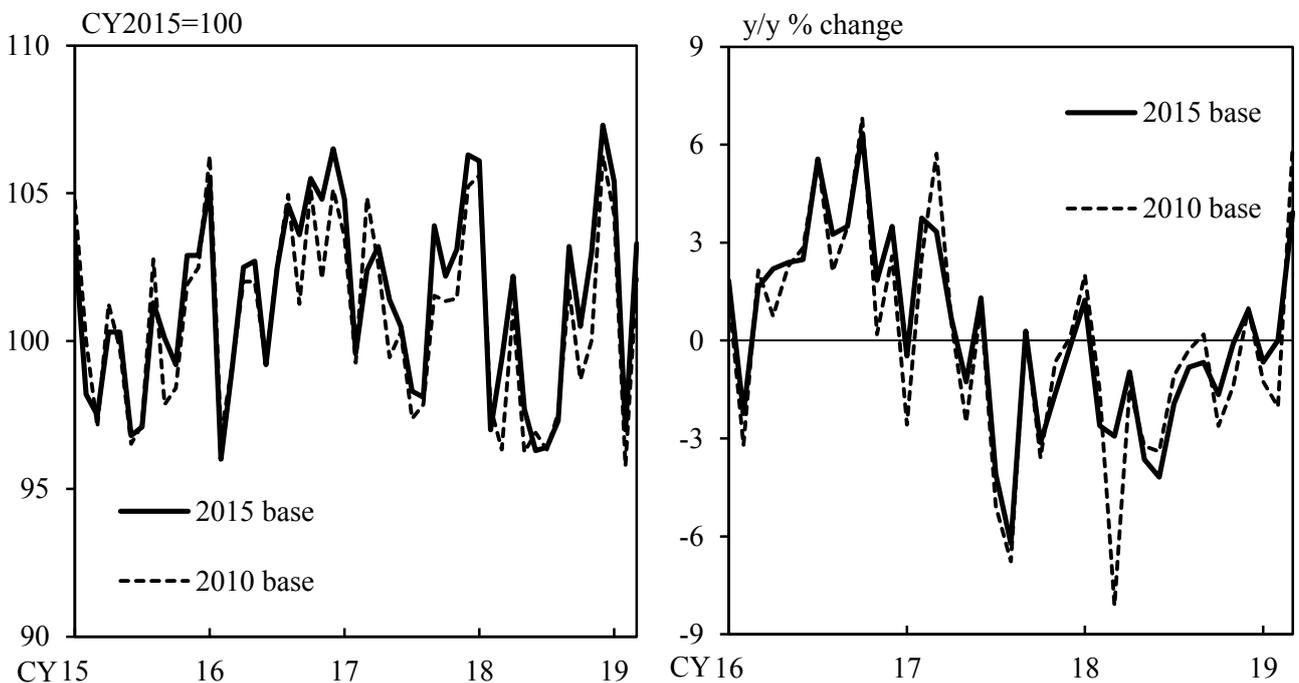
Revised Existing Items (4) : Advertising services

-- Revisions of the Quality Adjustment Methods --

(1) Newspaper advertising



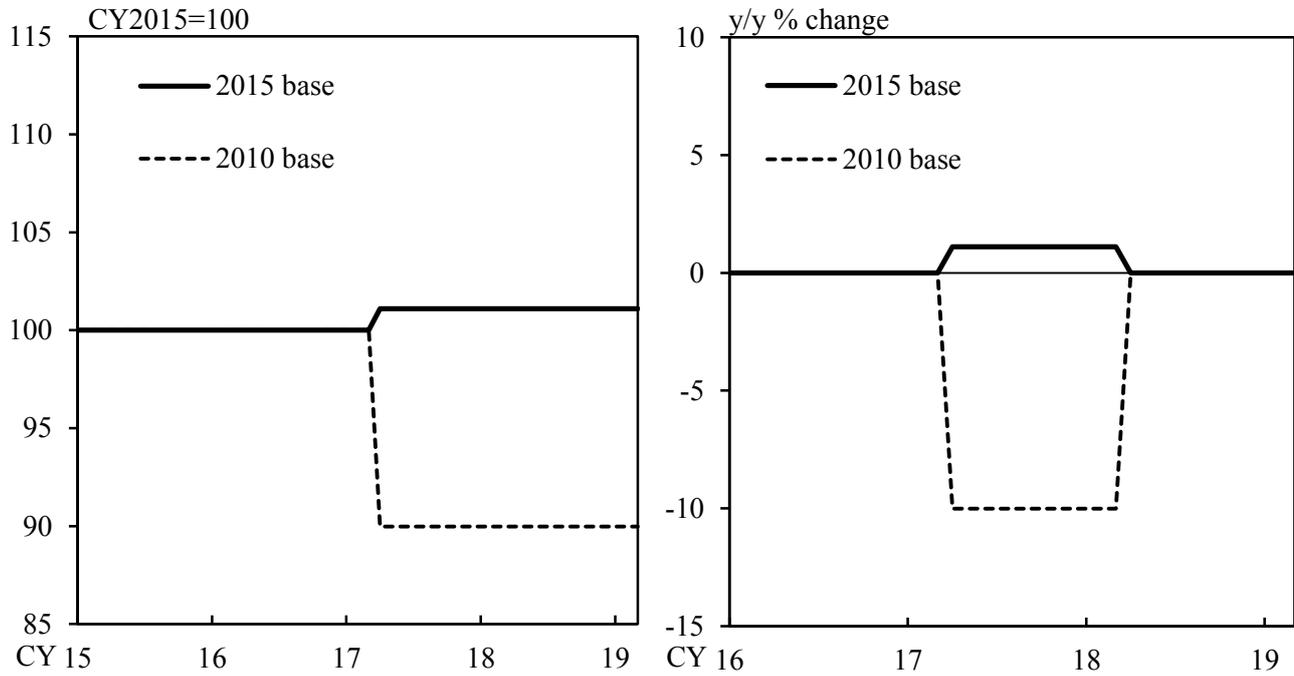
(2) Television advertising (program sponsorships)



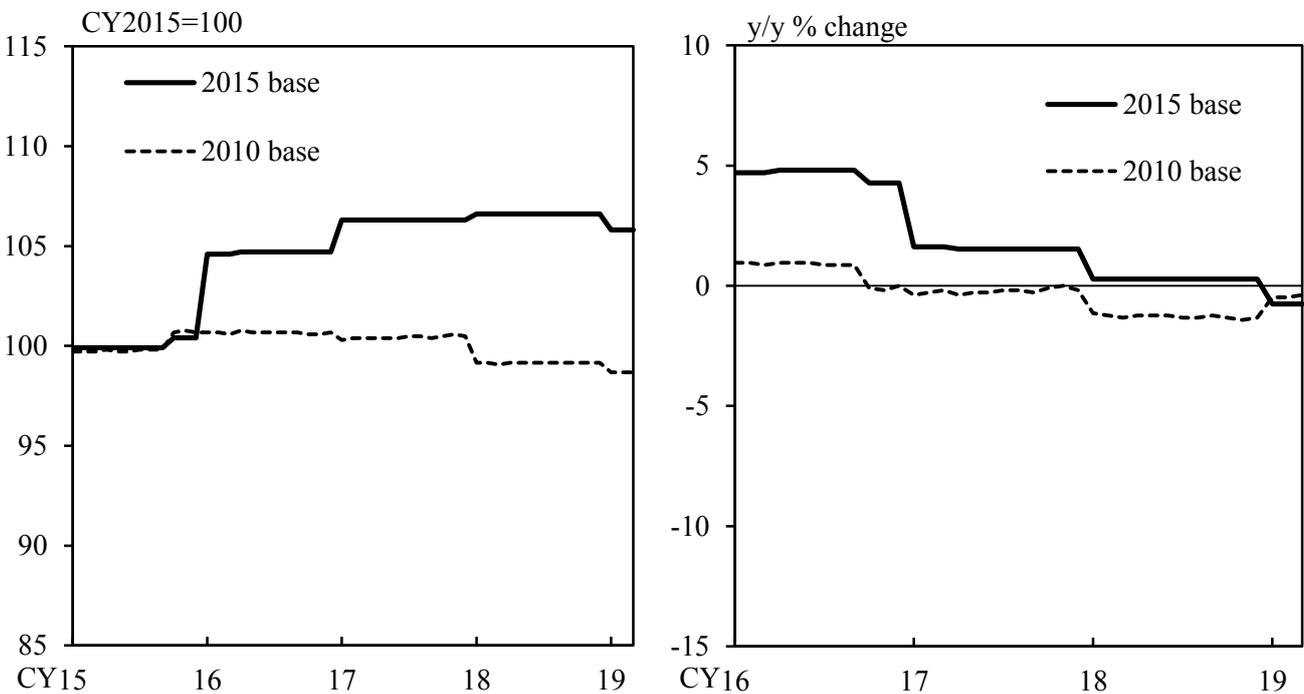
## Revised Existing Items (5) : Motor vehicle insurance

-- Revisions of the Quality Adjustment Methods --

### (1) Compulsory motor vehicle insurance



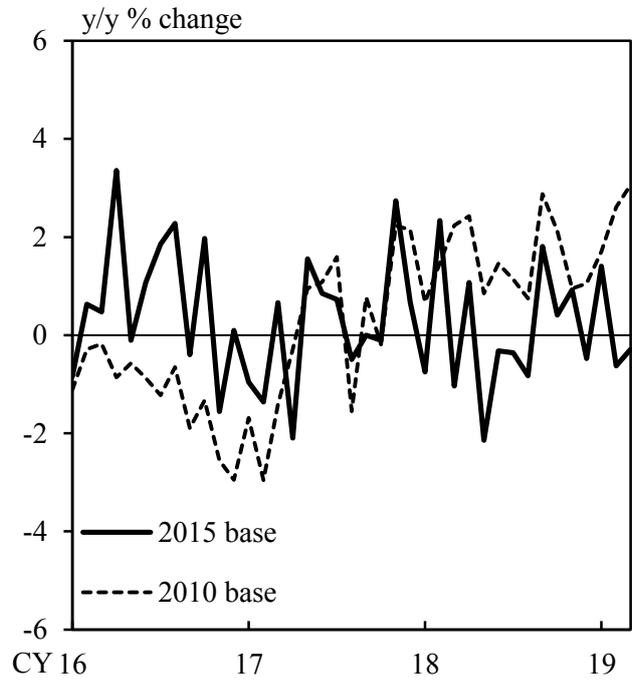
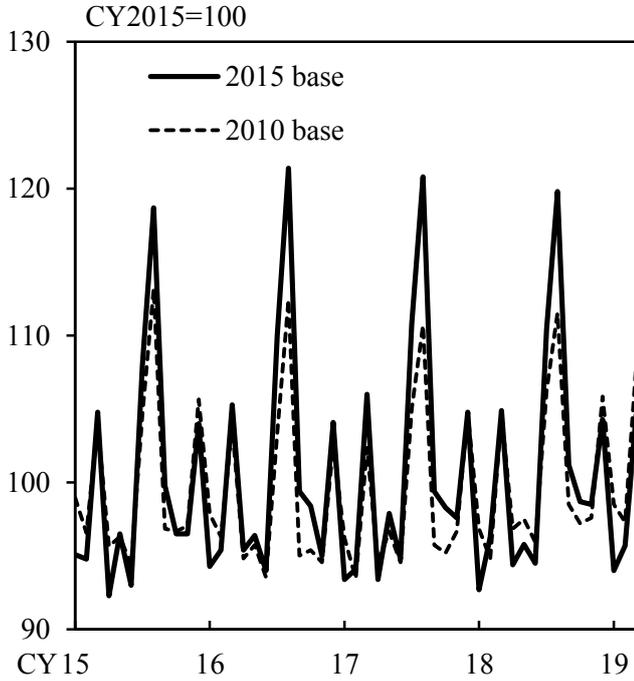
### (2) Voluntary motor vehicle insurance



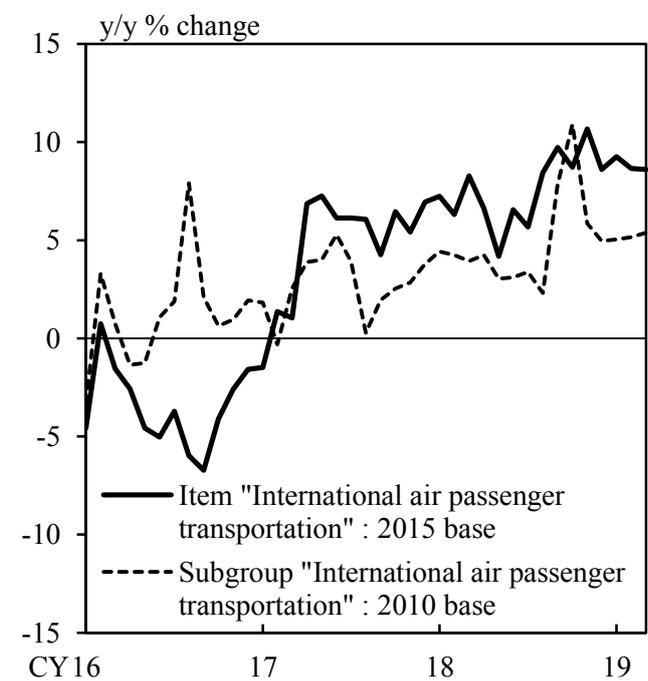
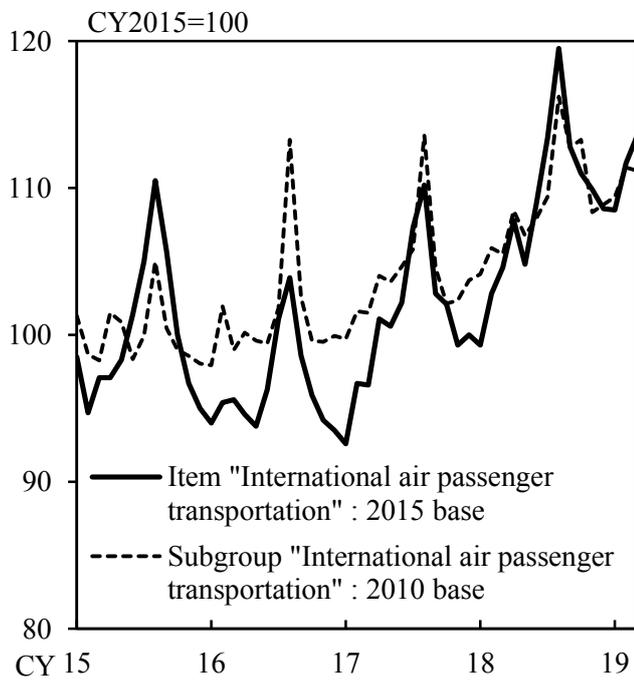
Revised Existing Items (6) : Passenger transportation

-- Revisions of the Pricing Methods --

(1) Domestic air passenger transportation



(2) International air passenger transportation



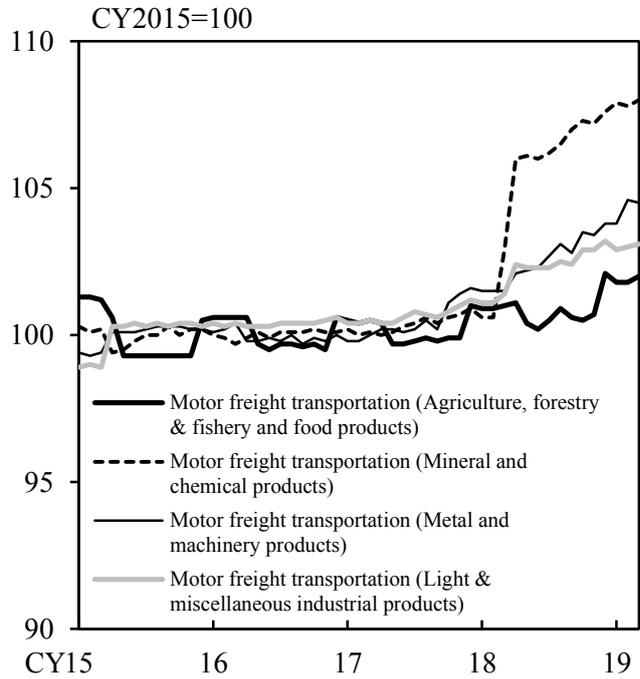
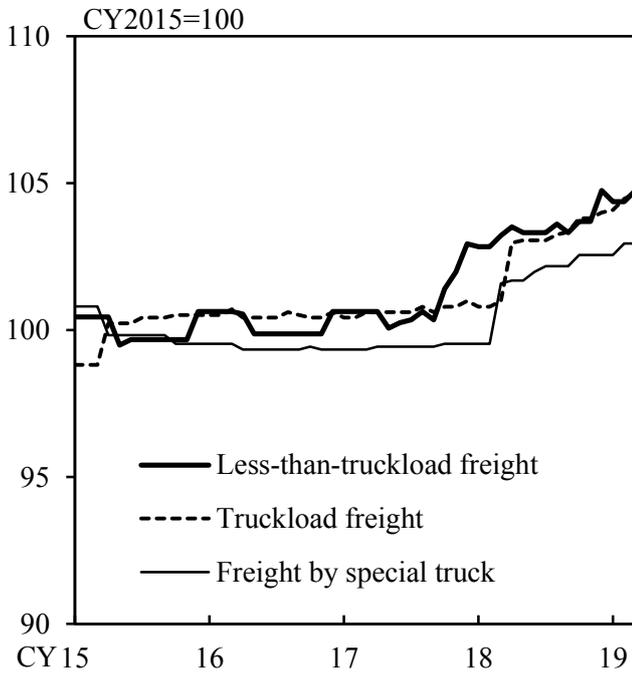
## Revised Existing Items (7) : Split Items

-- Refinement in terms of the Classification --

### (1) Review of Item Classification : Motor freight transportation

1. 2010 base

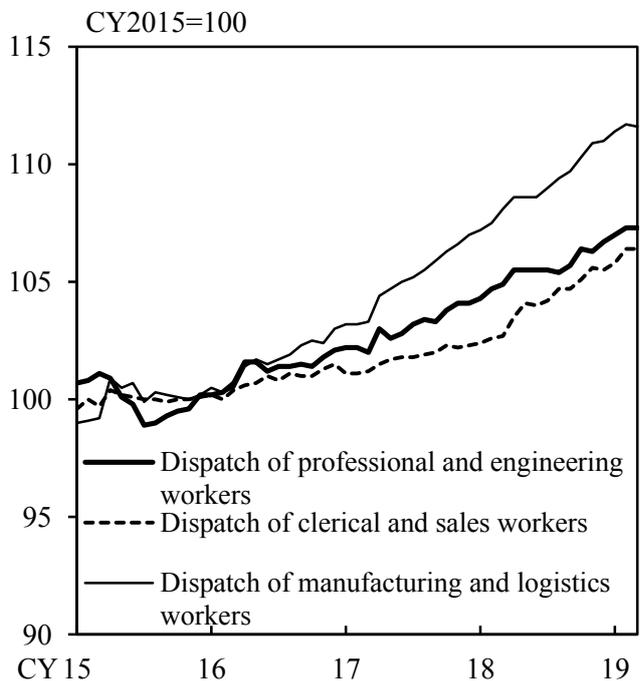
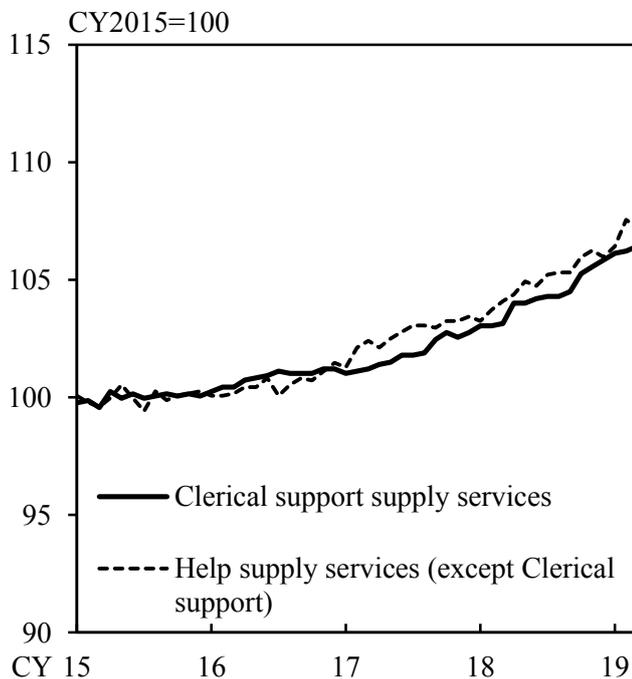
2. 2015 base



### (2) Review of Item Classification : Worker dispatching services

1. 2010 base

2. 2015 base



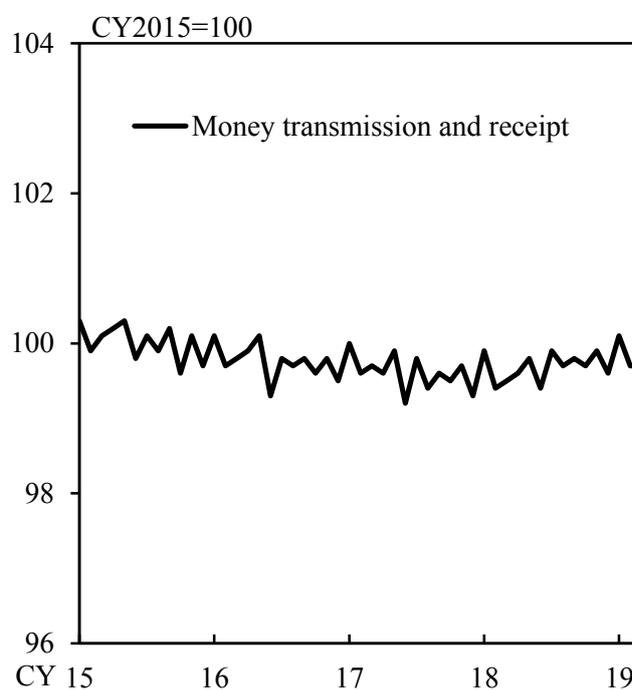
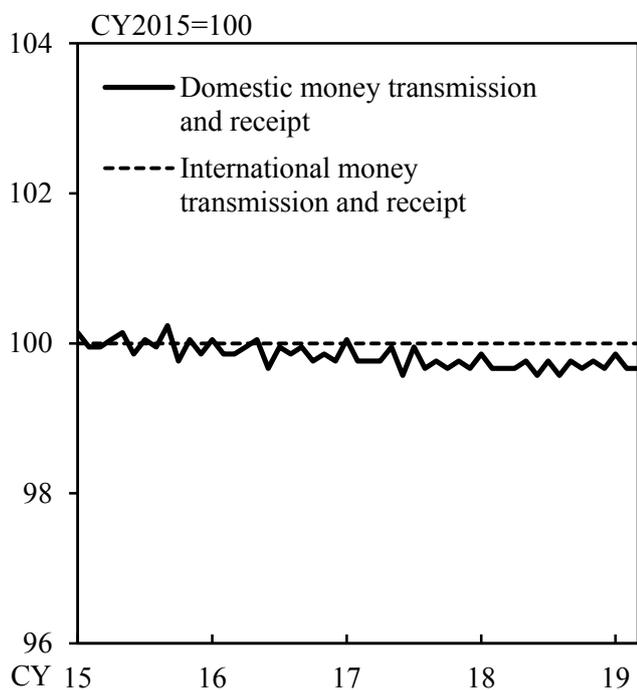
## Revised Existing Items (8) : Consolidated Items

-- Refinement in terms of the Classification --

### (1) Consolidation into "Money transmission and receipt"

1. 2010 base

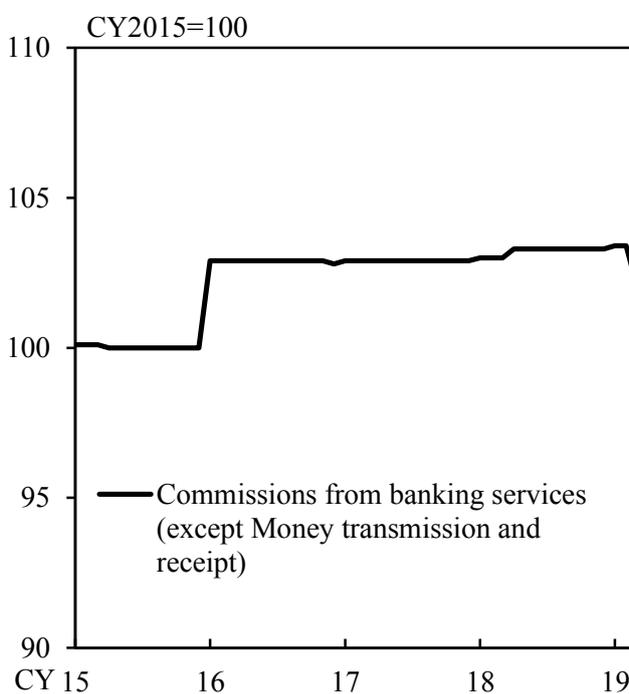
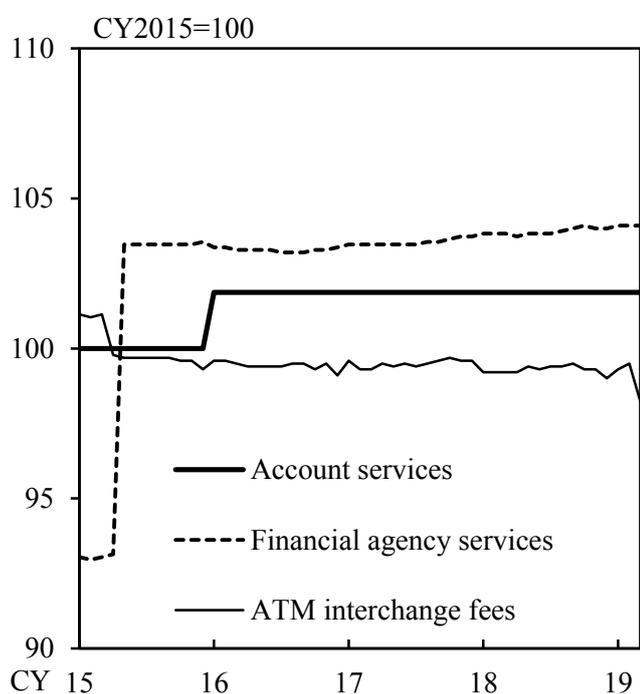
2. 2015 base



### (2) Consolidation into "Commissions from banking services (except Money transmission and receipt)"

1. 2010 base

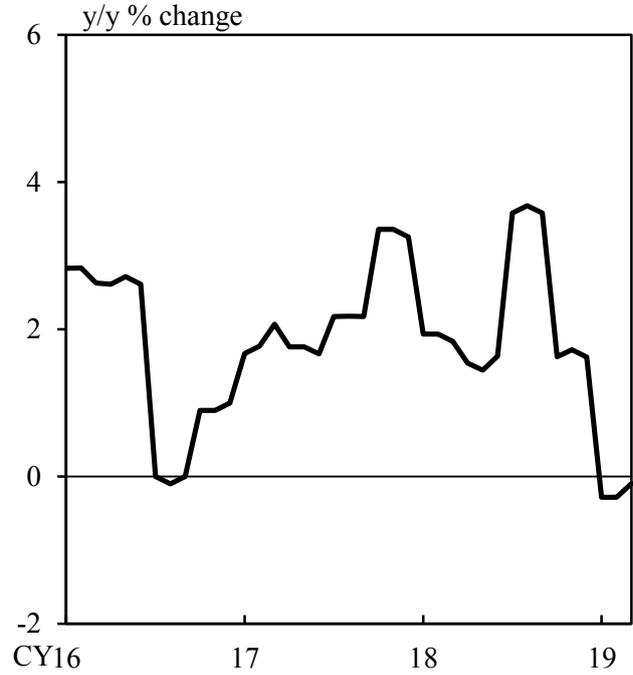
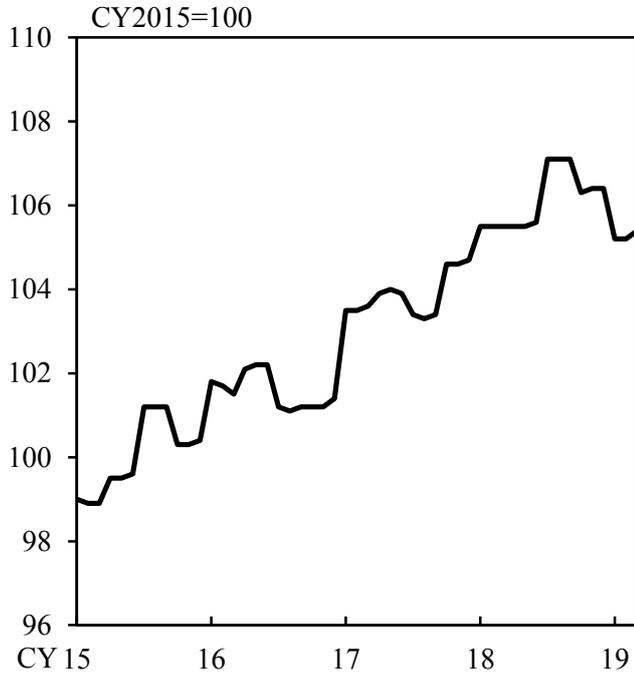
2. 2015 base



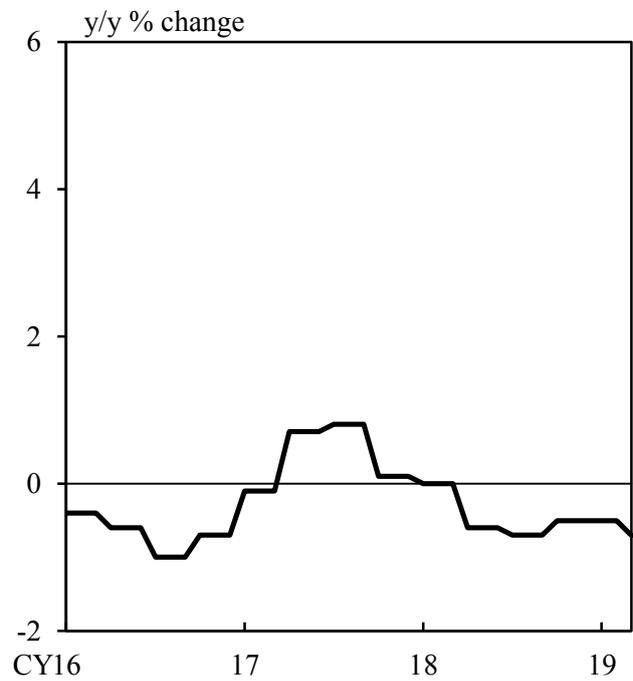
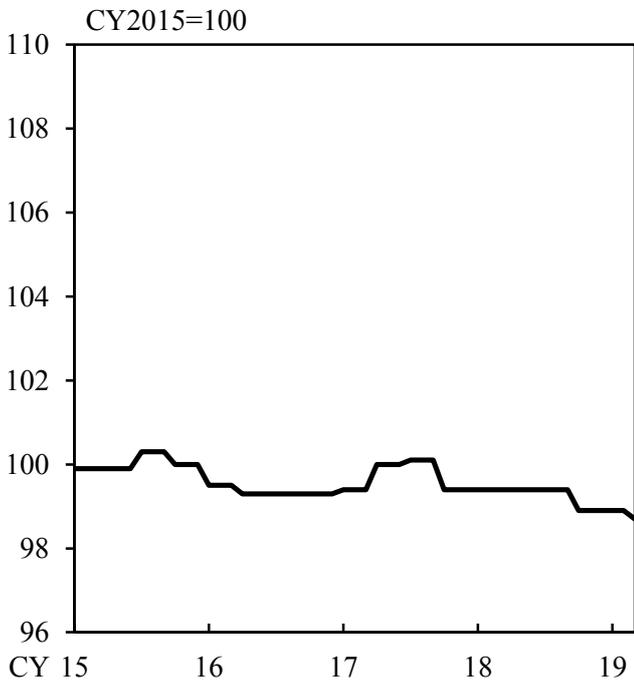
## Newly Added Items in the Basic Grouping Index (1)

-- Response to the Demands for the GDP Deflator --

### (1) Real estate agency and management services



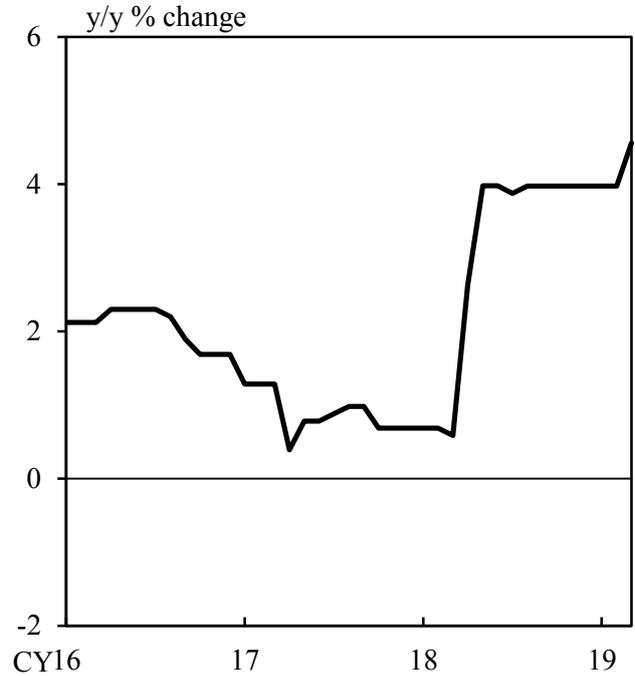
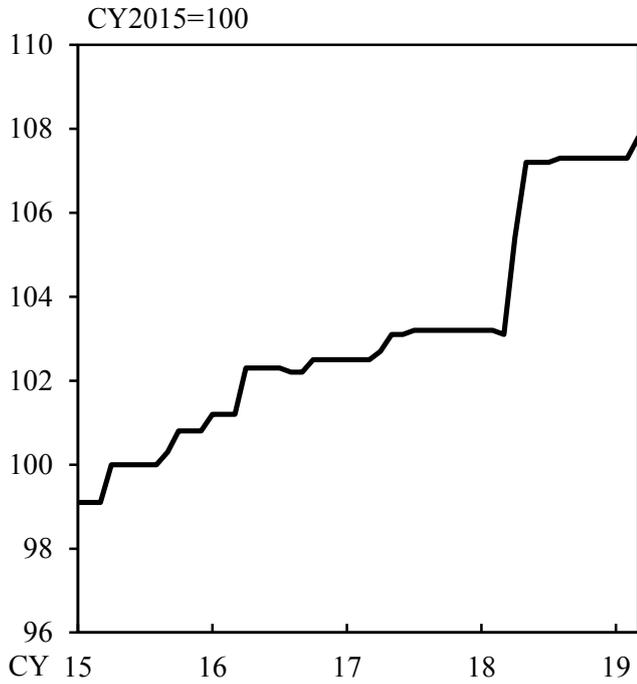
### (2) Television program production



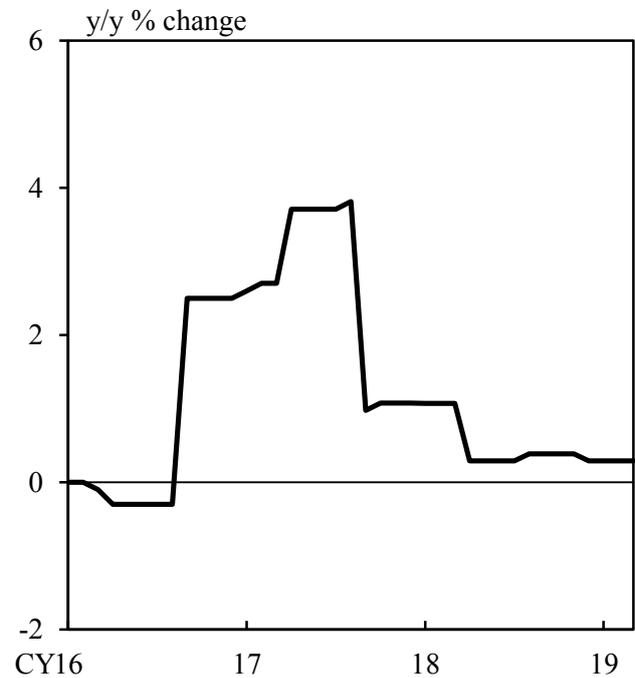
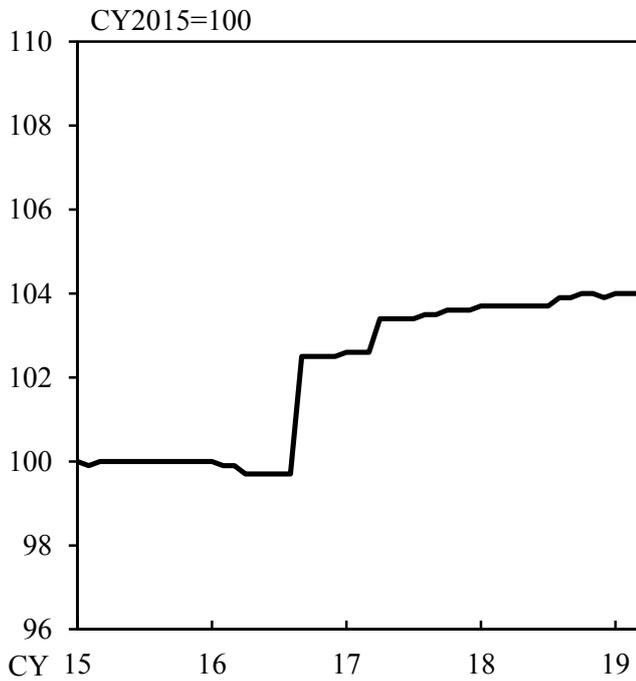
## Newly Added Items in the Basic Grouping Index (2)

-- Reflection of the Changes in Economic and Industrial Structures --

### (1) Non-destructive testing services



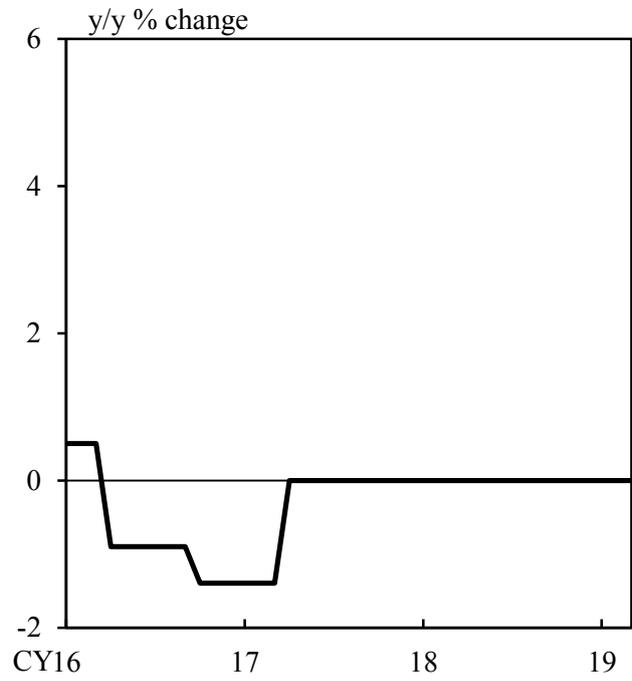
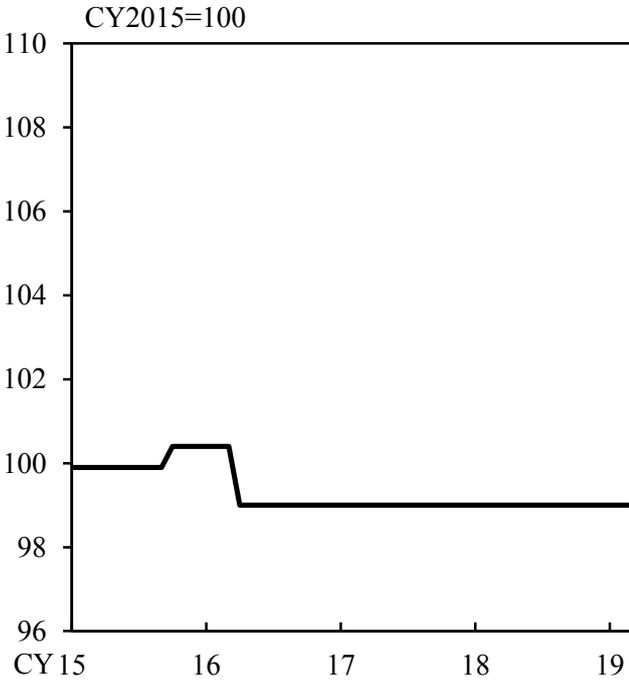
### (2) Financial product and commodity exchange services



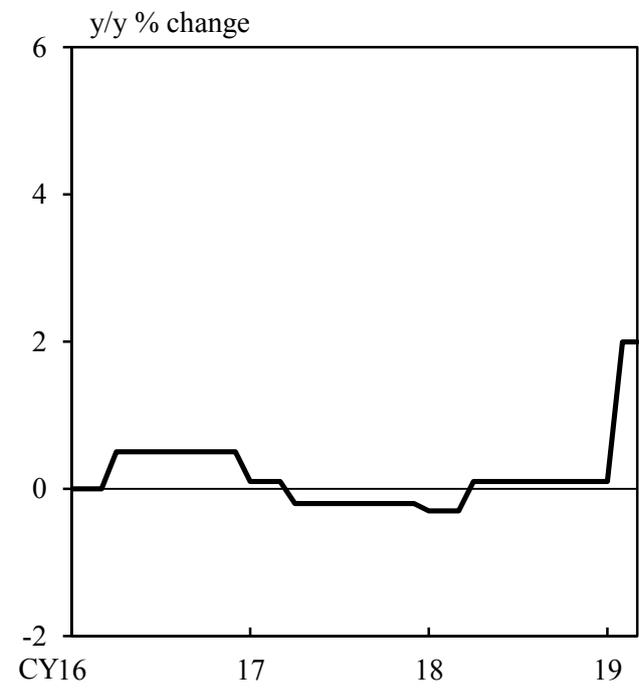
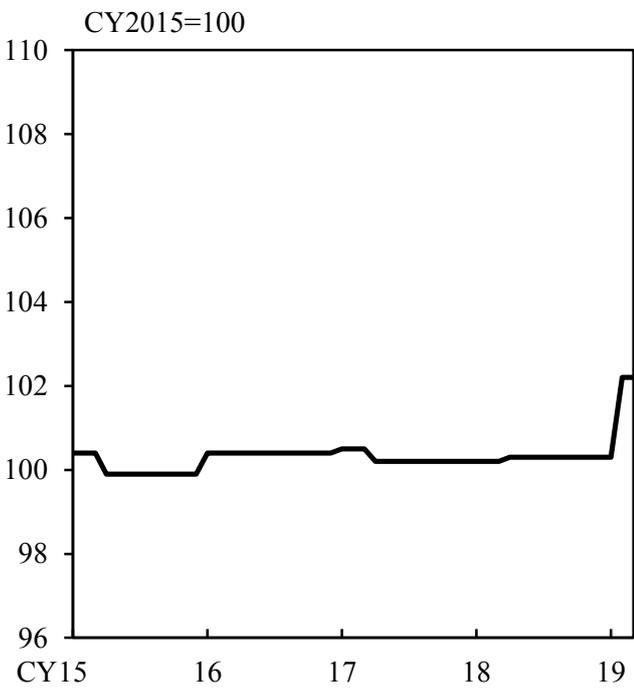
## Newly Added Items in the Basic Grouping Index (3)

-- Reflection of the Changes in Economic and Industrial Structures --

### (1) Liability insurance

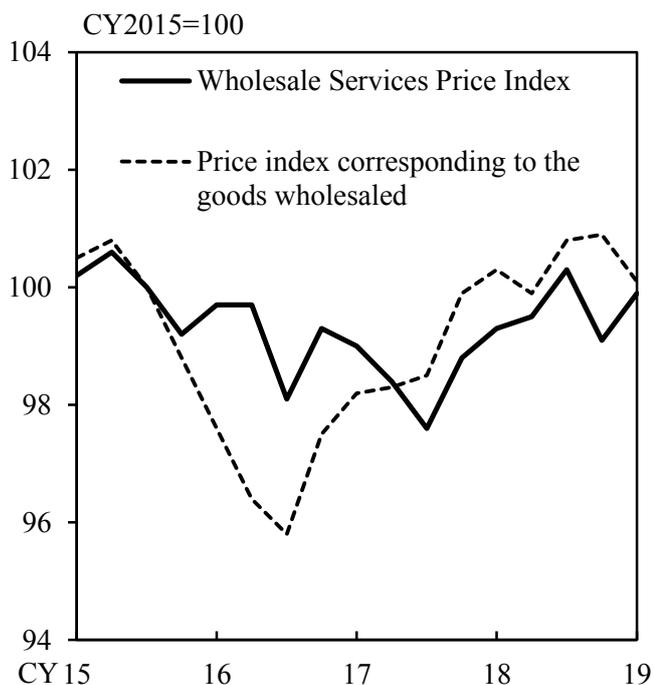


### (2) Health and hygiene

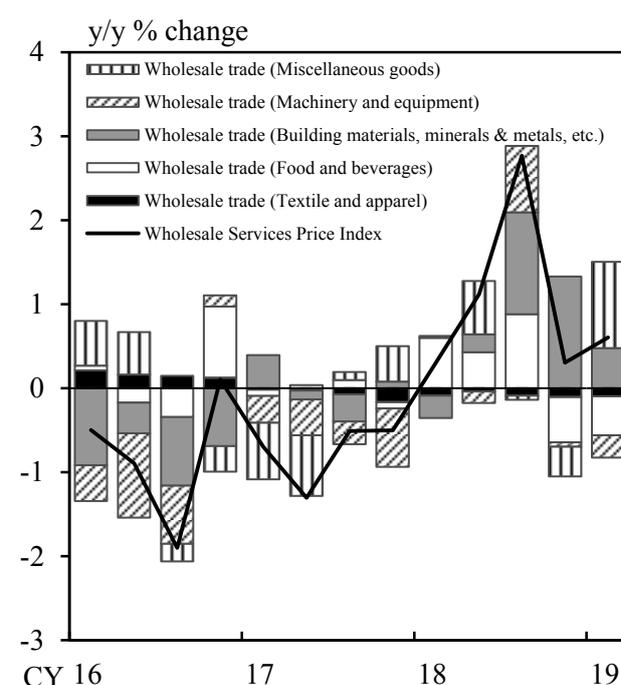


## New Reference Indexes (1) : Wholesale Services Price Index

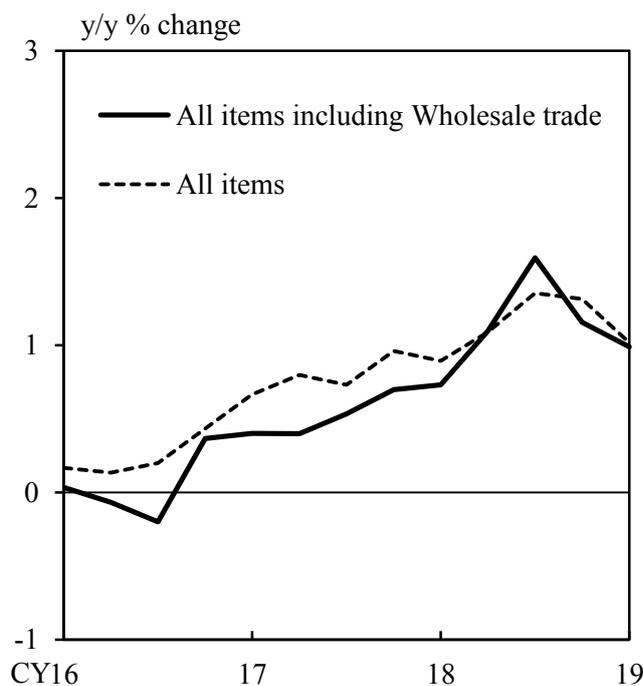
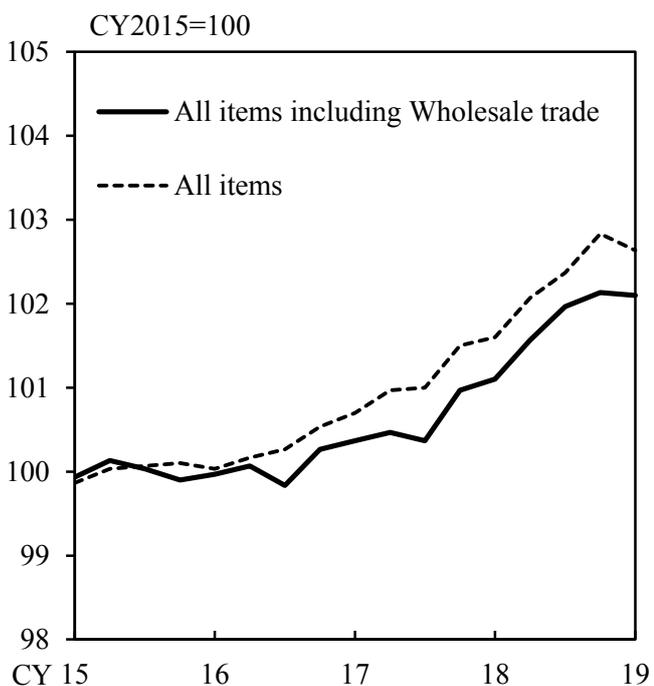
(1) Wholesale Services Price Index



(2) Year-on-Year Change



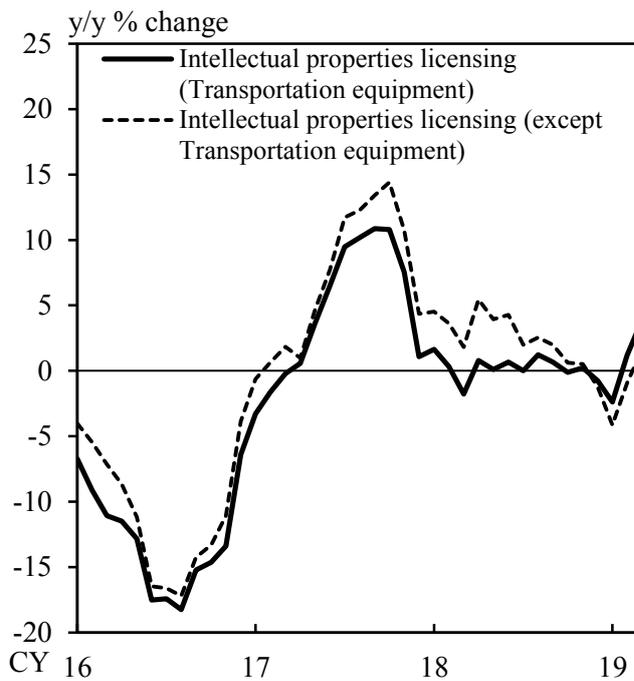
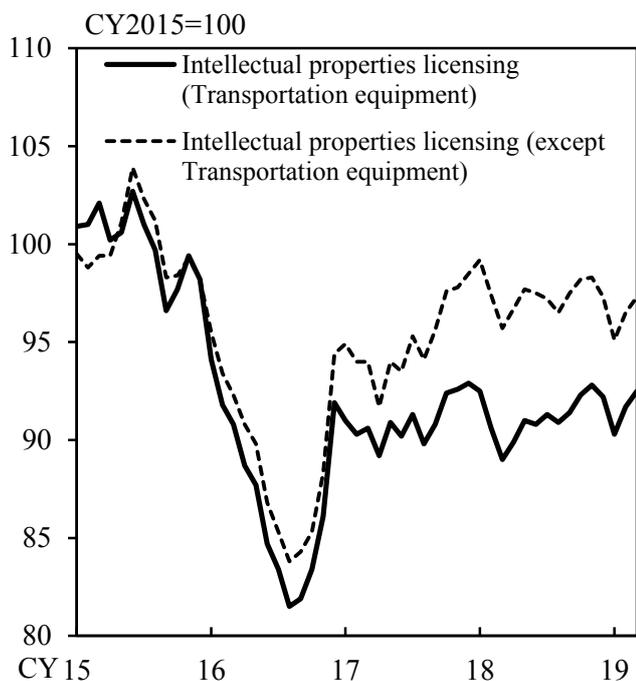
(3) All items including Wholesale trade



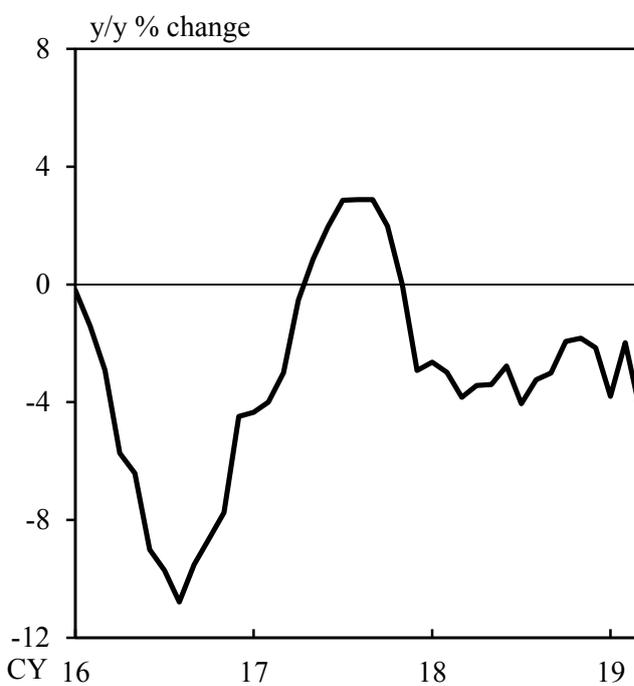
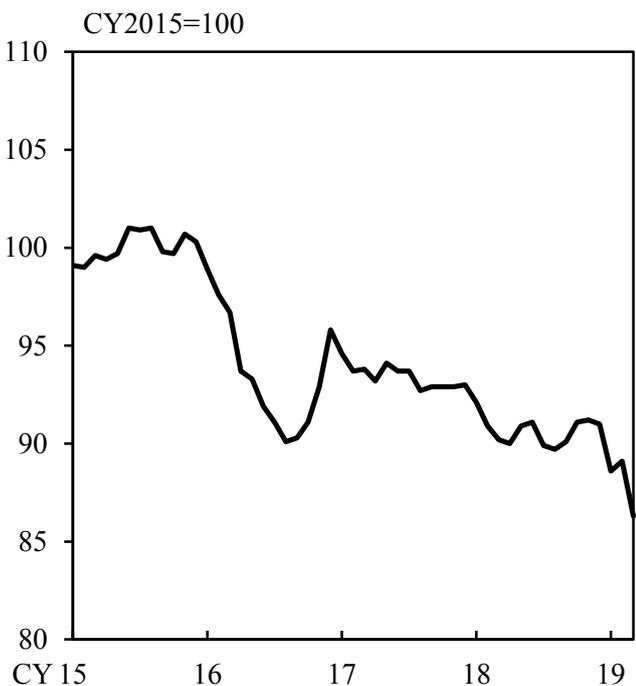
Notes : 1. "Price index corresponding to the goods wholesaled" in (1) is calculated as weighted average of price indexes (e.g. CGPI) with the weights of corresponding wholesale margin.  
 2. In (2), the value of "Wholesale Services Price Index" does not match the sum of each breakdown.

New Reference Indexes (2) : Intellectual properties licensing

(1) Intellectual properties licensing (Export)

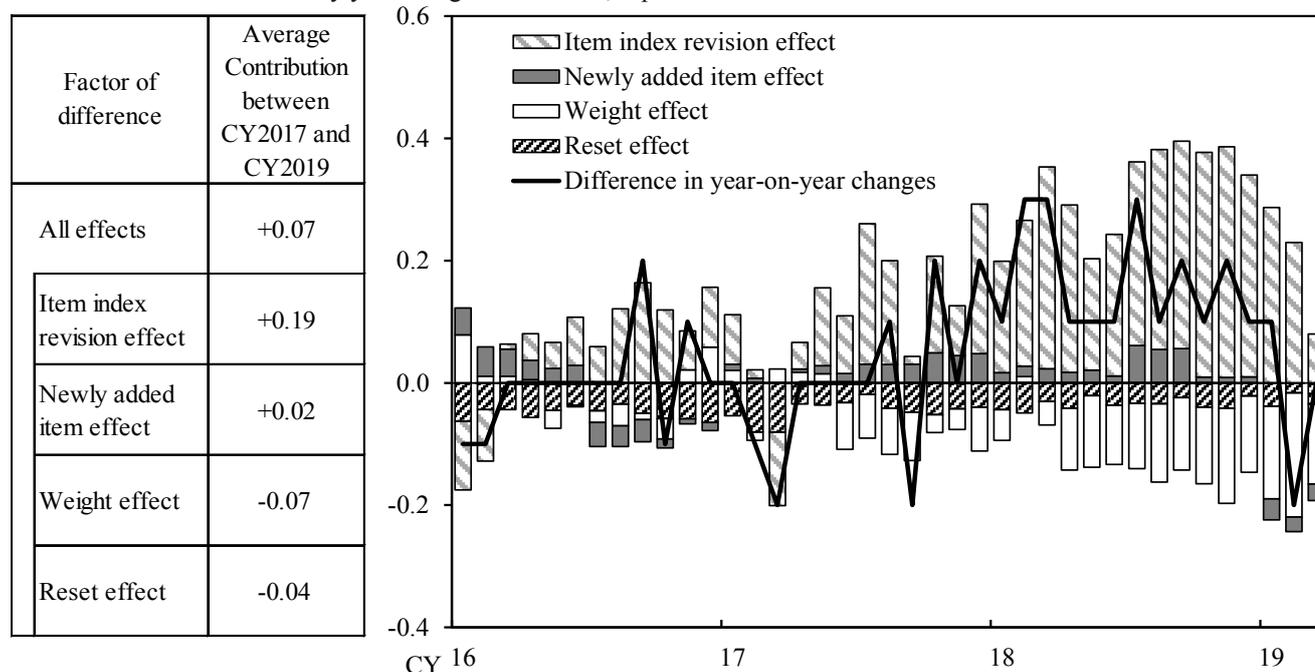


(2) Intellectual properties licensing (Import)

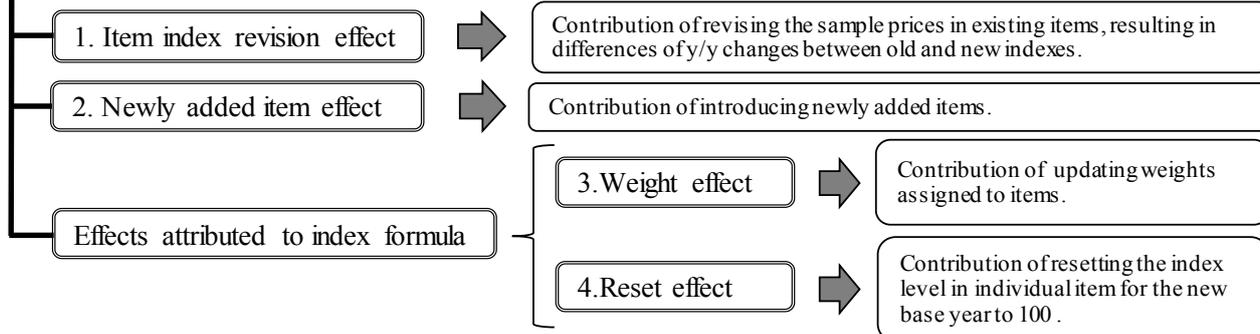


## Decomposing the Difference between the Old and New Indexes : Year-on-Year Changes in the Index for "All items"

Contribution to difference in y/y % change of All items, %pt.



### Decomposition of the Difference in Year-on-Year Changes between Old and New Indexes (All items except Wholesale trade)



Each effect is calculated from the following formula:

y/y changes of All items in year  $t$  (2015 base) - y/y changes of All items in year  $t$  (2010 base) =

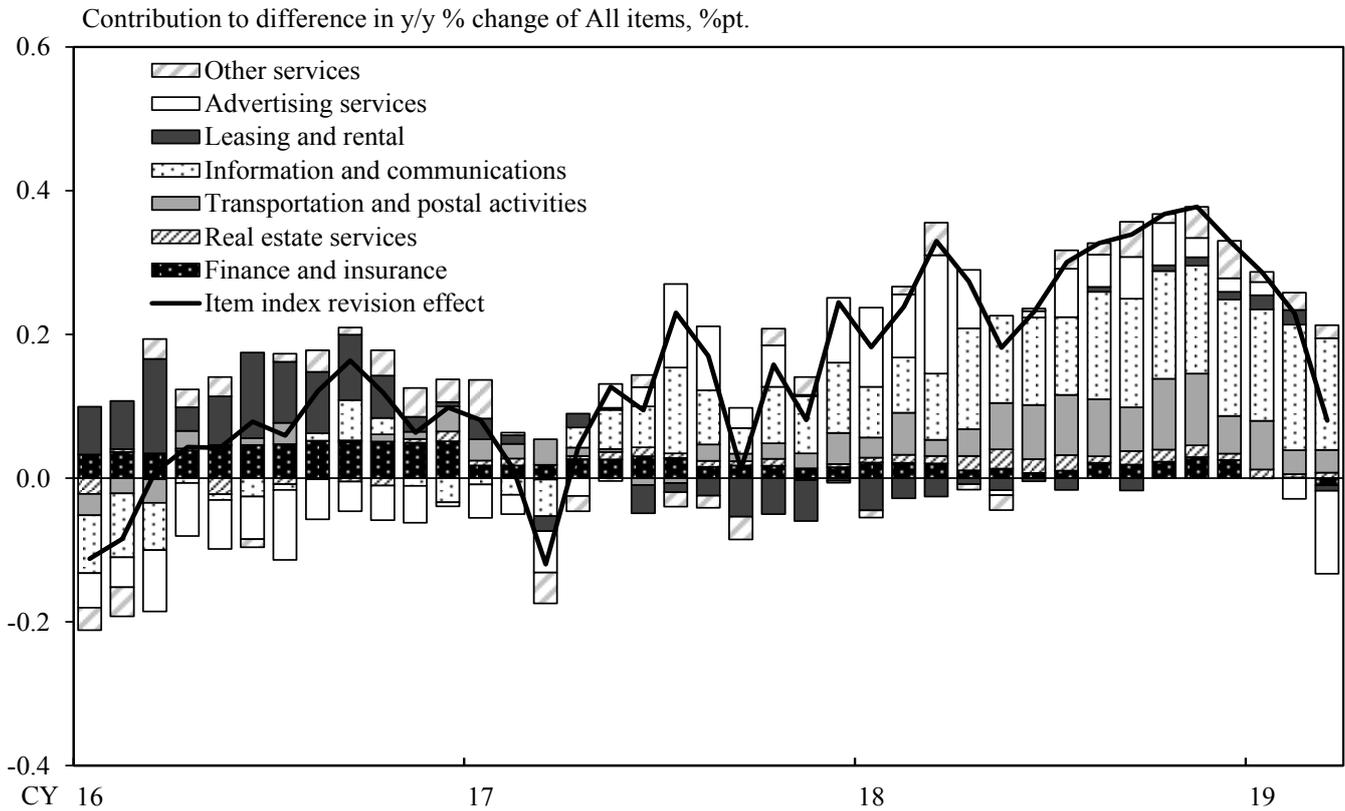
$$\underbrace{\sum_{i:\text{existing items}} \left\{ \frac{p_i^{15}(t-1)}{P^{15}(t-1)} \cdot \pi_i^{15}(t) - \frac{p_i^{10R}(t-1)}{P^{10R}(t-1)} \cdot \pi_i^{10}(t) \right\} \cdot w_i^{15}}_{\text{item index revision effect}} + \underbrace{\sum_{i:\text{new items}} \left\{ \frac{p_i^{15}(t-1)}{P^{15}(t-1)} \cdot \pi_i^{15}(t) - \frac{p_i^{10R}(t-1)}{P^{10R}(t-1)} \cdot \pi_i^{10}(t) \right\} \cdot w_i^{15}}_{\text{newly added item effect}} + \underbrace{\sum_{i:\text{all items}} \left[ \frac{p_i^{10}(t-1)}{P^{10}(t-1)} \cdot \pi_i^{10}(t) \cdot (w_i^{15} - w_i^{10}) + \left\{ \frac{p_i^{10R}(t-1)}{P^{10R}(t-1)} - \frac{p_i^{10}(t-1)}{P^{10}(t-1)} \right\} \cdot \pi_i^{10}(t) \cdot w_i^{15} \right]}_{\substack{\text{weight effect} \\ \text{reset effect}}}$$

- |  |  |
|--|--|
| $p_i^{10}(t)$ : index of item $i$ in year $t$ (2010 base)                      | $p_i^{15}(t)$ : index of item $i$ in year $t$ (2015 base)        |
| $P^{10}(t)$ : index of All items in year $t$ (2010 base)                       | $P^{15}(t)$ : index of All items in year $t$ (2015 base)         |
| $w_i^{10}$ : weight of item $i$ (2010 base)                                    | $w_i^{15}$ : weight of item $i$ (2015 base)                      |
| $\pi_i^{10}(t)$ : y/y change of item $i$ in year $t$ (2010 base)               | $\pi_i^{15}(t)$ : y/y change of item $i$ in year $t$ (2015 base) |
| $p_i^{10R}(t)$ : index of item $i$ in year $t$ (2010 base) reset to CY2015=100 |  |
| $P^{10R}(t)$ : index of All items in year $t$ (2010 base) reset to CY2015=100  |  |

Note: Contribution of each effect is calculated from non-rounded item indexes. Thus, the sum of each effect may not match the published index which is rounded off to the first decimal place. Figures of 2019 represent January-March 2019. The same applies hereafter.

## Item Index Revision Effect

### (1) Item index revision effect



### (2) Major Item index revision effect

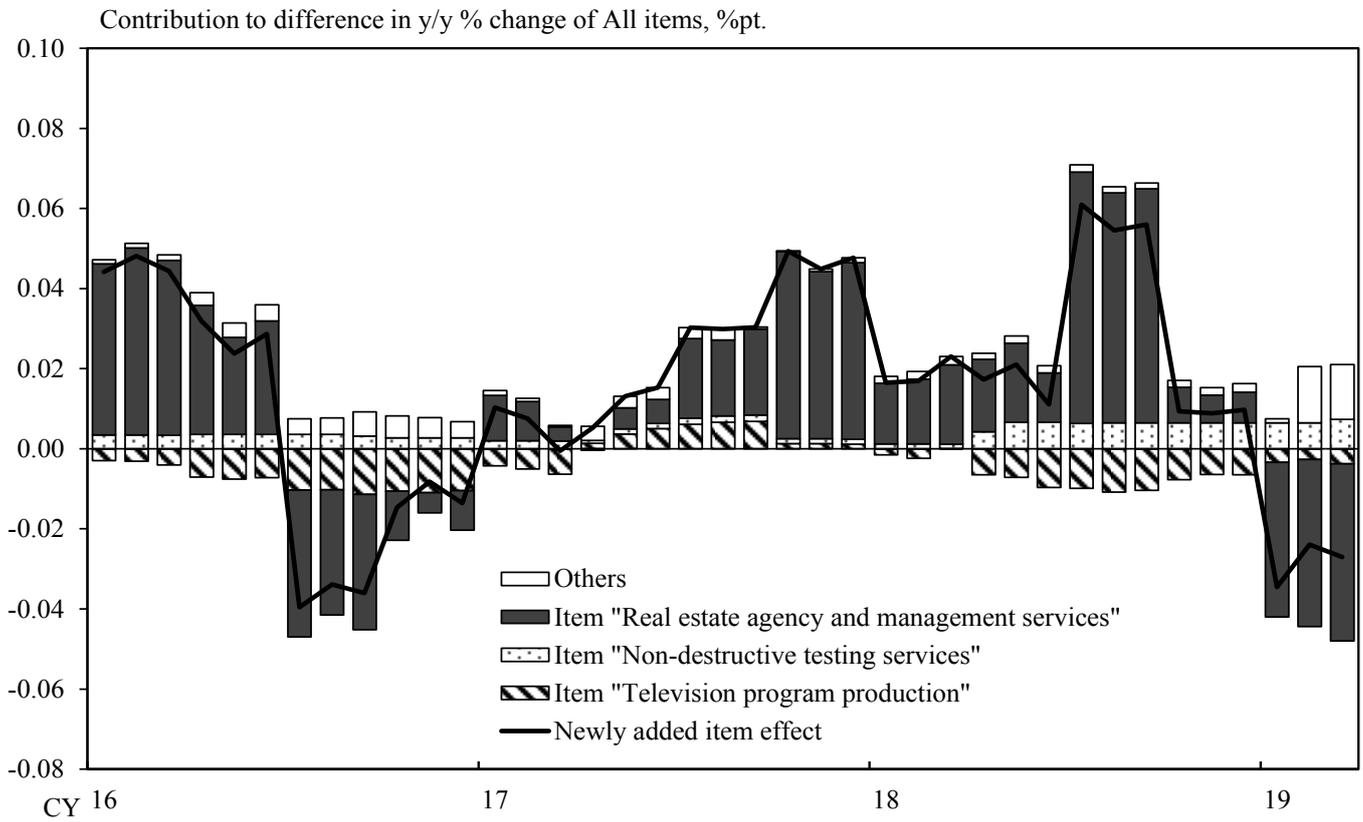
Contribution of "Item index revision effect" to difference in y/y % change of All items, %pt.

	Major groups	Items etc.	Average Contribution between CY2017 and CY2019
Positive Contribution	Information and communications	Internet based services (Subgroup)	+0.08
	Advertising services	Internet advertising	+0.03
	Finance and insurance	Motor vehicle insurance (Voluntary & Compulsory)	+0.02
	Other services	Worker dispatching services (Subgroup)	+0.01
	Transportation and postal activities	Ocean freight transportation (except Ocean tankers)	+0.01
	Transportation and postal activities	Door-to-door parcel delivery	+0.01
	Transportation and postal activities	Motor freight transportation	+0.01
Negative Contribution	Other services	Civil engineering and architectural services (Subgroup)	-0.02
	Leasing and rental	Temporary material rental	-0.01
	Advertising services	Newspaper advertising	-0.01

Note: "Motor freight transportation" is calculated by aggregating "Motor freight transportation (Agriculture, forestry & fishery and food products)," "Motor freight transportation (Mineral and chemical products)," "Motor freight transportation (Metal and machinery products)" and "Motor freight transportation (Light & miscellaneous industrial products)."

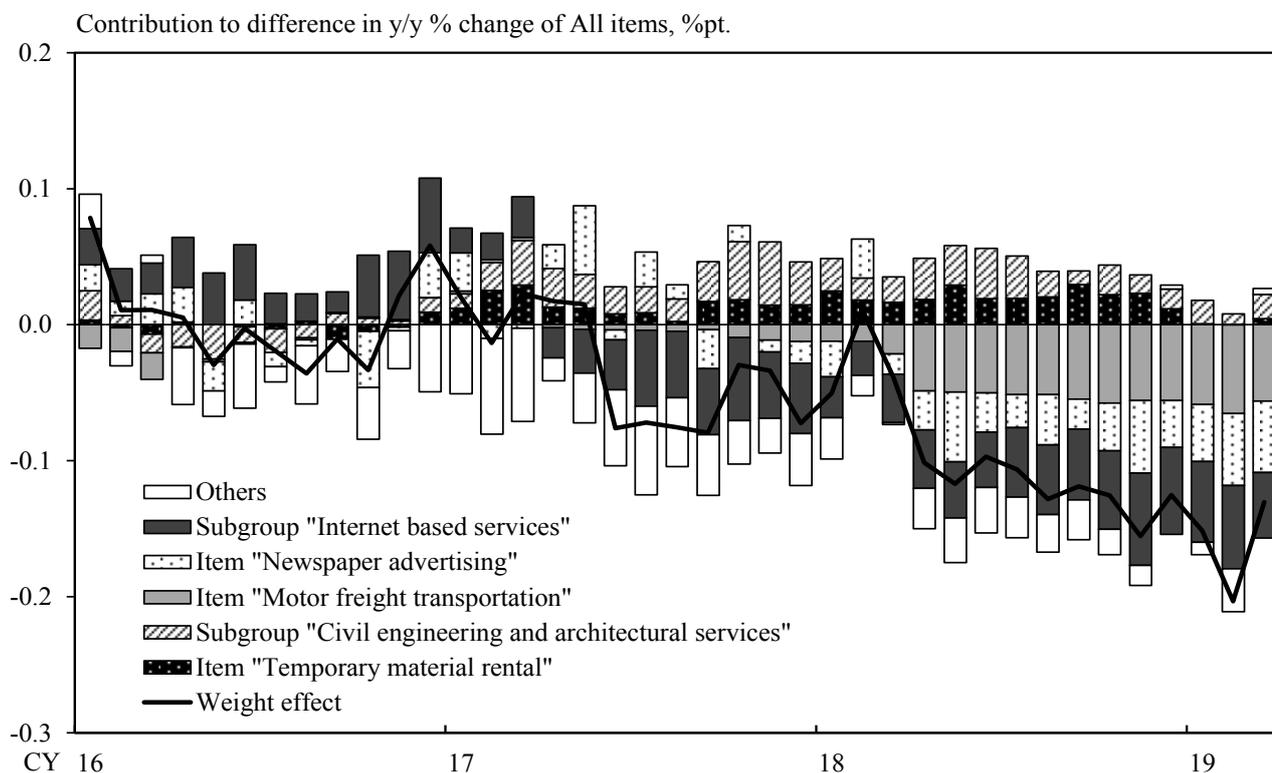
## Newly Added Item Effect

### (1) Newly added item effect

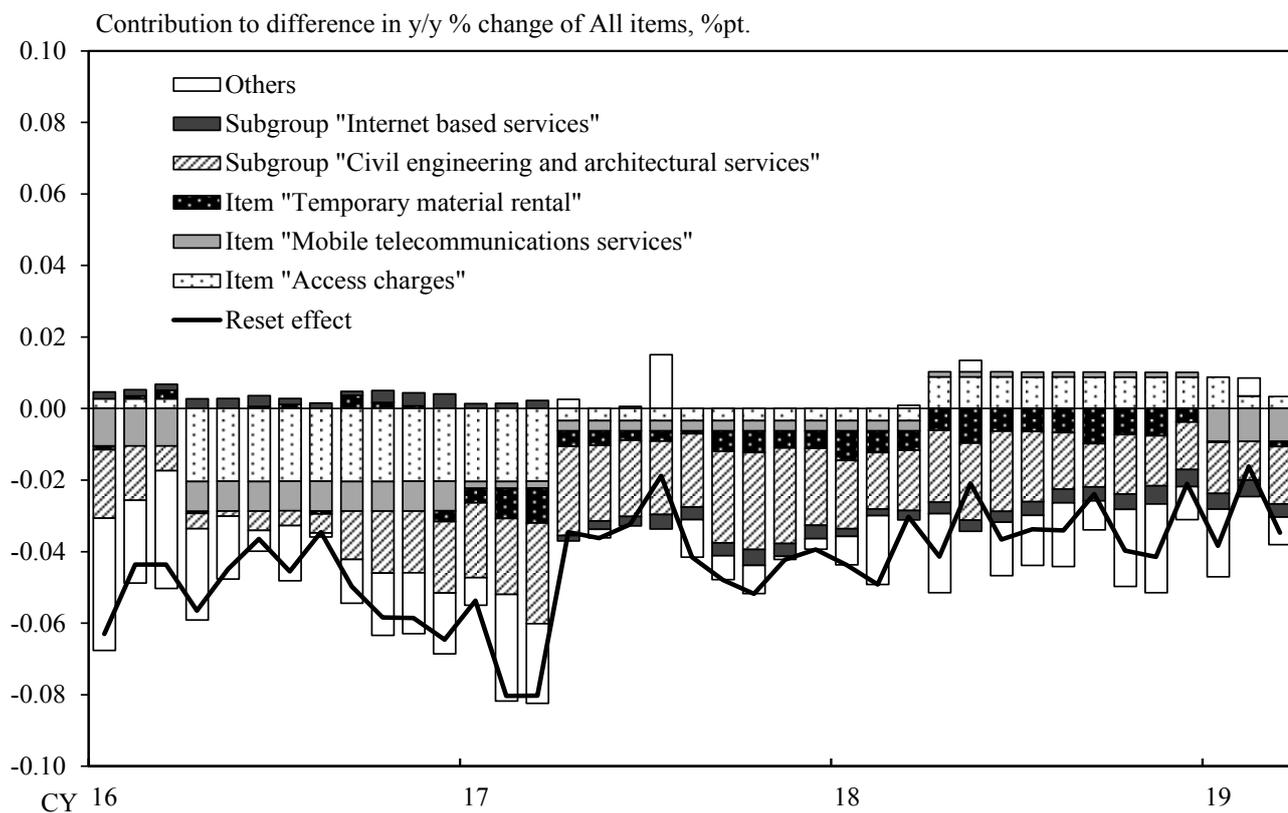


## Weight Effect and Reset Effect

### (1) Weight effect



### (2) Reset effect



## Publication and Pricing Method of the Wholesale Services Price Index

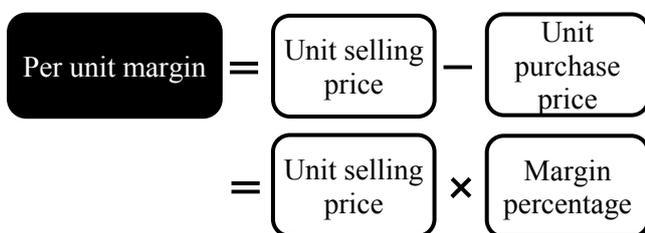
(1) Publication timing (e.g. indexes published in August 2019)

	2018			2019							
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Indexes except Wholesale Services Price Index	Published									Revised indexes	Preliminary indexes
Wholesale Services Price Index	Published			Revised indexes			Preliminary indexes				

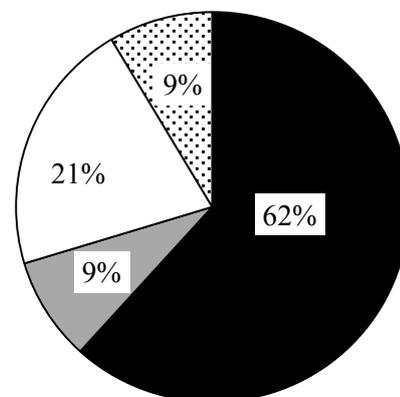
(2) Classification

All items including Wholesale trade
Wholesale trade
Wholesale trade (Textile and apparel)
Wholesale trade (Food and beverages)
Wholesale trade (Building materials, minerals & metals, etc.)
Wholesale trade (Machinery and equipment)
Wholesale trade (Miscellaneous goods)

(3) Pricing method



(4) Ratio of each pricing method



- Unit selling price & Unit purchase price
- Unit selling price & Margin percentage
- Margin percentage only
- ▣ Others

Notes: 1. For the unit selling price in (3), if relevant information is not available, it will be substituted by price indexes of corresponding products (e.g. Corporate Goods Price Index).  
 2. "Others" in (4) corresponds to cases that survey commission rates, etc.

## Quality Adjustment Methods Applied to Advertising Services

### (1) Newspaper advertising

#### 1. Regression equation

$$\log \underbrace{Y_{i,j,t}}_{\text{Column price}} = \alpha + \beta \log \underbrace{X_{i,t}}_{\text{Number of copies sold}} + \underbrace{\mu_{i,j}}_{\text{Fixed effect}} + \varepsilon_{i,j,t}$$

### (2) Television advertising (program sponsorships)

#### 1. Regression equation

$$\log \underbrace{Y_{i,t}}_{\text{Price per airtime}} = \alpha + \beta \log \underbrace{X_{i,t}}_{\text{Viewer rating}} + \underbrace{\mu_i}_{\text{Fixed effect}} + \varepsilon_{i,t}$$

#### 2. Estimated results

	$\alpha$	$\beta$	$R^2$
Jan. 2010- Dec. 2015	-1.895 *** <0.602>	1.277 *** <0.111>	0.996
Jan. 2015- Dec. 2018	2.855 *** <0.553>	0.381 *** <0.104>	0.996

#### 2. Estimated results

	$\alpha$	$\beta$	$R^2$
Jan. 2010- Nov. 2018	10.576 *** <0.065>	0.281 *** <0.035>	0.953
Jan. 2015- Nov. 2018	10.542 *** <0.118>	0.308 *** <0.065>	0.966

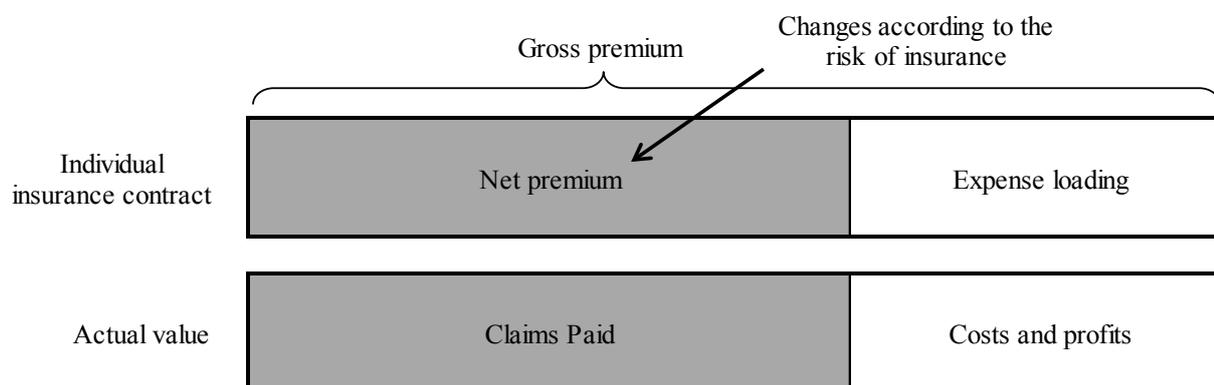
### (3) List of Quality Adjustment Methods in Advertising Services

Item	Sample Price	Quality Adjustment by Number of Viewers
Television advertising (spot advertising)	"Price per Gross Rating Point (GRP)"	Adjusting quality by number of viewers as an main quality-evaluation criteria.
Television advertising (program sponsorships)	"Price per airtime" (excluding effects due to the change in viewer rating)	
Newspaper advertising	"Price per column" (excluding effects due to the change in copies sold)	
Internet advertising	"Price per impression" "Price per click" "Price per view" "Price per conversion"	
Leaflet advertising Direct mail Free newspaper and magazine advertising	Price with number of copies fixed	
Magazine advertising	"Price per page"	Quality adjustment by number of viewers has not been introduced due to data limitations.
Radio advertising Outdoor advertising Advertising in traffic facilities	Price with transaction conditions fixed (program, time zone, layout, customer, etc.)	

- Notes: 1. In the regression equation of (1),  $i, j$ , and  $t$  represents newspaper publisher, the condition of sample price (e.g. layout of the article) and period, respectively.
2. In the regression equation of (2),  $i$  and  $t$  represents TV station and period, respectively.
3. Both (1) and (2) use the seasonally adjusted monthly data series. Values in parentheses describe the standard deviation. \*\*\* denotes significance at the 1 percent level.
4. In (2), periods between Mar. - May 2011 are excluded from the data as the impact of the Great East Japan Earthquake influenced largely.

## Quality Adjustment Methods Applied to Property and Casualty Insurance

### (1) Structure of the Premiums



### (2) Quality Adjustment Method

Item	Information on net premium
Compulsory motor vehicle insurance	Quality adjustment is implemented on the occasion of price revisions using the net premium rate (= net premium / gross premium) calculated by the General Insurance Rating Organization of Japan (GIROJ).
Voluntary motor vehicle insurance	Quality adjustment is implemented every January, applying the actual loss ratio obtained from previous fiscal year's financial statements as a proxy variable for the net premium rate.

Note: Actual loss ratio (incurred to earned basis loss ratio) is calculated using the equation below.

$$\text{Actual loss ratio} = \frac{\text{Claims paid in current term} + \text{Claims unpaid in current term} - \text{Claims unpaid in previous term}}{\text{Earned premium}}$$

## Breakdown of the Revision and Removal of Items

### 1. Newly Added Items

2015 base/Subgroup	2010 base/Item		2015 base/Item
Financial services (commission)	N/A	⇒	Financial product and commodity exchange services
Property and casualty insurance services			Liability insurance
Real estate agency and management services			Real estate agency and management services
Video picture information production			Television program production
Commodity inspection, non-destructive testing and surveyor certification services			Non-destructive testing services
Health and hygiene			Health and hygiene
2015 base/Reference index	2010 base/Item		2015 base/Item
Wholesale Services Price Index	N/A	⇒	Wholesale trade
			Wholesale trade (Textile and apparel)
			Wholesale trade (Food and beverages)
			Wholesale trade (Building materials, minerals & metals, etc.)
			Wholesale trade (Machinery and equipment)
Services Export Price Index	N/A	⇒	Wholesale trade (Miscellaneous goods)
			Intellectual properties licensing
Services Import Price Index	N/A	⇒	Intellectual properties licensing (Transportation equipment)
			Intellectual properties licensing (except Transportation equipment)
			Intellectual properties licensing

### 2. Deleted Item

2015 base/Subgroup	2010 base/Item		2015 base/Item
Broadcasting services	Private broadcasting	⇒	Deleted

### 3. Split Items

2015 base/Subgroup	2010 base/Item		2015 base/Item	
Road freight transportation	Less-than-truckload freight	⇒	Motor freight transportation (Agriculture, forestry & fishery and food products)	
	Truckload freight		Motor freight transportation (Mineral and chemical products)	
	Freight by special truck		Motor freight transportation (Metal and machinery products)	
Software development	Custom software	⇒	Motor freight transportation (Light & miscellaneous industrial products)	
			Custom software (except Embedded software)	
Information processing and information providing services	Data processing services (except ASP)	⇒	Embedded software	
			Entrusted computing services (except Cloud application)	
Internet based services	Internet based services	⇒	Data processing and related services	
			Web portals	
Worker dispatching services	Clerical support supply services	⇒	Internet support services	
			Help supply services (except Clerical support)	Dispatch of professional and engineering workers
				Dispatch of clerical and sales workers
			Dispatch of manufacturing and logistics workers	

## Breakdown of the Revision and Removal of Items (Cont'd)

### 4. Consolidated Items

2015 base/Subgroup	2010 base/Item	2015 base/Item
Financial services (commission)	Domestic money transmission and receipt	⇒ Money transmission and receipt
	International money transmission and receipt	
	Account services	⇒ Commissions from banking services (except Money transmission and receipt)
	Financial agency services	
	ATM interchange fees	
	Securities brokerage services	⇒ Commissions from securities services
	Underwriting services	
Securities selling services		
International air passenger transportation	International air passenger transportation (to/from North America)	⇒ International air passenger transportation
	International air passenger transportation (to/from Europe)	
	International air passenger transportation (to/from Asia)	
Ocean freight transportation	Ocean liners	⇒ Ocean freight transportation (except Ocean tankers)
	Ocean tramp steamers	
Postal services and mail delivery	Letters	⇒ Domestic postal services and mail delivery
	Postal cards	
	Special mail services	
Mobile telecommunications services	Cellular phone services and PHS services	⇒ Mobile telecommunications services
	Mobile data communications services	

### 5. Expanded Item

2015 base/Subgroup	2010 base/Item	2015 base/Item
Financial services (commission)	Interchange fees for credit card and electronic money payments	⇒ Interchange fees for credit & debit card and electronic money payments

### 6. Renamed Items

2015 base/Subgroup	2010 base/Item	2015 base/Item
Information processing and information providing services	ASP	⇒ Entrusted computing services (Cloud application)
	Market research and public opinion polling	⇒ Market research, opinion survey and social survey
Leasing	Transportation equipment leasing	⇒ Car leasing
Call centers	Telemarketing	⇒ Call centers
Hotels	Hotels	⇒ Hotels
Meal supply services	Meal services for schools, hospitals, and nursing homes	⇒ Meal supply services

### 7. Transferred Items

2015 base/Item	2010 base/Subgroup	2015 base/Subgroup
Credit guarantee	Financial services	⇒ Property and casualty insurance services
Internet data centers	Fixed telecommunications services	⇒ Internet based services

Note: "International air passenger transportation" in Services Import Price Index and "Ocean freight transportation" in Reference (Contract currency basis) are consolidated in the same way as above, respectively.

## Classification and Weights

### 1. Basic grouping index

Major group	Group	Subgroup	Item	Weights
All items				1000.0
	Finance and insurance			48.3
		Financial services		34.7
			Financial services (commission)	34.7
			Money transmission and receipt	3.8
			Commissions from banking services (except Money transmission and receipt)	9.1
			Commissions from securities services	14.4
			Securities issuance, transfer and related services	1.8
			Interchange fees for credit & debit card and electronic money payments	4.8
			Financial product and commodity exchange services	0.8
		Insurance services		13.6
			Property and casualty insurance services	13.6
			Fire insurance	1.5
			Voluntary motor vehicle insurance	7.4
			Compulsory motor vehicle insurance	1.2
			Marine and other transportation insurance	0.9
			Liability insurance	1.7
			Credit guarantee	0.9
	Real estate services			94.5
		Real estate agency and management services		23.9
			Real estate agency and management services	23.9
			Real estate agency and management services	23.9
		Real estate rental		70.6
			Office space rental	26.5
			Office space rental (Tokyo area)	19.1
			Office space rental (Nagoya area)	1.2
			Office space rental (Osaka area)	4.0
			Office space rental (other areas)	2.2
			Other space rental	44.1
			Sales space rental	27.1
			Hotel rental	3.7
			Warehouse space rental	9.3
			Parking space rental	4.0
	Transportation and postal activities			158.0
		Passenger transportation		37.0
			Railroad passenger transportation	19.8
			Shinkansen bullet train	8.4
			Railroad passenger transportation (except Shinkansen bullet train)	11.4
			Road passenger transportation	9.7
			Route bus	2.2
			Chartered bus	1.3
			Hired car and taxi	6.2
			Water passenger transportation	0.3
			Coastal and inland water passenger transportation	0.3
			International air passenger transportation	1.2
			International air passenger transportation	1.2
			Domestic air passenger transportation	6.0
			Domestic air passenger transportation	6.0
		Overland freight transportation		55.9
			Railroad freight transportation	0.9
			Railroad freight transportation	0.9

## Classification and Weights (Cont'd)

Major group	Group	Subgroup	Item	Weights
			Road freight transportation	55.0
			Motor freight transportation (Agriculture, forestry & fishery and food products)	6.2
			Motor freight transportation (Mineral and chemical products)	10.6
			Motor freight transportation (Metal and machinery products)	14.7
			Motor freight transportation (Light & miscellaneous industrial products)	11.3
			Door-to-door parcel delivery	10.6
			Drops off deliveries in postboxes	1.6
			Marine freight transportation	20.0
			Ocean freight transportation	7.6
			Ocean freight transportation (except Ocean tankers)	5.4
			Ocean tankers	2.2
			Coastal and inland water freight transportation	5.0
			RORO ships	0.5
			Coastal and inland water freighters (except RORO ships)	2.2
			Coastal and inland water ferries (motor vehicle carriers only)	0.7
			Coastal and inland water tankers	1.6
			Marine cargo handling	7.4
			Marine cargo handling	7.4
			Air freight transportation	1.4
			International air freight transportation	1.0
			International air freight transportation	1.0
			Domestic air freight transportation	0.4
			Domestic air freight transportation	0.4
			Warehousing and other transportation services	34.2
			Warehousing and storage	13.0
			Ordinary warehousing and storage	8.9
			Refrigerated warehousing and storage	4.1
			Packing for freight	6.3
			Packing for freight	6.3
			Toll roads	10.6
			National expressways	6.2
			Urban expressways	2.4
			Other toll roads	2.0
			Services relating to water transport	0.4
			Services relating to water transport	0.4
			Airport & air traffic control and services relating to air transport	3.9
			Airport & air traffic control and services relating to air transport	3.9
			Postal services and mail delivery	9.5
			Postal services and mail delivery	9.5
			Domestic postal services and mail delivery	8.8
			International mail services	0.7
			Information and communications	228.3
			Communications services	56.8
			Fixed telecommunications services	24.1
			Fixed telephone services	9.3
			Leased circuit services	2.0
			Internet connection services	11.1
			WAN (Wide Area Network) services	1.7
			Mobile telecommunications services	16.5
			Mobile telecommunications services	16.5
			Access charges	16.2
			Access charges	16.2
			Broadcasting services	2.5
			Broadcasting services	2.5
			Public broadcasting	0.6
			Cable broadcasting	1.9

## Classification and Weights (Cont'd)

Major group	Group	Subgroup	Item	Weights
			Information services	129.1
			Software development	75.0
			Custom software (except Embedded software)	63.2
			Embedded software	3.9
			Prepackaged software	7.9
			Information processing and information providing services	54.1
			Entrusted computing services (Cloud application)	2.5
			Entrusted computing services (except Cloud application)	14.6
			System management and operation services	16.7
			Data processing and related services	11.9
			Database provision services	5.7
			Market research, opinion survey and social survey	2.7
			Internet based services	19.6
			Internet based services	19.6
			Web portals	14.3
			Internet support services	4.1
			Internet data centers	1.2
			Image and character information production	20.3
			Video picture information production	8.0
			Television program production	8.0
			Newspapers	4.5
			Newspapers	4.5
			Publishing	7.8
			Book publishing	3.8
			Monthly magazine publishing	3.3
			Weekly magazine publishing	0.7
			Leasing and rental	79.2
			Leasing	54.3
			Leasing	54.3
			Industrial machinery leasing	7.7
			Leasing of machinery and equipment for metalworking	1.4
			Medical equipment leasing	2.3
			Leasing of machinery and equipment for commercial and other services	9.1
			Communications equipment leasing	5.2
			Leasing of machinery for civil engineering and construction	2.9
			Leasing of computer and related equipment	14.7
			Office equipment leasing	2.5
			Car leasing	8.5
			Rental	24.9
			Rental	24.9
			Construction machinery and equipment rental	11.7
			Temporary material rental	6.9
			Computer rental	1.0
			Car rental	3.5
			Communications & office equipment rental and machinery & equipment rental for service industries	1.8
			Advertising services	49.2
			Advertising services	49.2
			Television advertising	19.2
			Television advertising (program sponsorships)	8.8
			Television advertising (spot advertising)	10.4
			Newspaper advertising	4.1
			Newspaper advertising	4.1
			Magazine advertising	1.3
			Magazine advertising	1.3
			Leaflet advertising	4.1
			Leaflet advertising	4.1

## Classification and Weights (Cont'd)

Major group	Group	Subgroup	Item	Weights
			Internet advertising	10.9
			Internet advertising	10.9
			Other advertising services	9.6
			Radio advertising	0.8
			Outdoor advertising	0.9
			Advertising in traffic facilities	2.7
			Direct mail	3.3
			Free newspaper and magazine advertising	1.9
			Other services	342.5
			Sewage and waste disposal	26.9
			Sewage disposal	9.0
			Sewage disposal	9.0
			Waste disposal	17.9
			Domestic waste disposal	6.6
			Industrial waste disposal	11.3
			Motor vehicle & machinery repair and maintenance	66.2
			Motor vehicle repair and maintenance	23.3
			Periodic and regular motor vehicle inspection & general maintenance	18.4
			Motor vehicle maintenance (accident repair)	4.9
			Machinery repair and maintenance	42.9
			Electric & electronic product repair and maintenance	10.8
			Machinery repair and maintenance (except Electric & electronic products)	32.1
			Professional services	41.4
			Legal and accounting services	38.1
			Attorney services	4.4
			Patent attorney services	3.1
			Judicial scrivener services	1.3
			Certified public accountant services	9.9
			Licensed tax accountant services	19.4
			Other professional services	3.3
			Certified social insurance and labor specialist services	1.3
			Certified real estate evaluation services	0.6
			Certified administrative procedures specialist services	0.5
			Certified real estate assessor services for registration	0.9
			Technical services	56.2
			Civil engineering and architectural services	29.8
			Architectural design services	13.1
			Civil engineering design services	11.2
			Surface surveying	4.9
			Subsurface surveying	0.6
			Commodity inspection, non-destructive testing and surveyor certification services	6.6
			Commodity inspection services	3.2
			Non-destructive testing services	1.6
			Environmental surveying certification	1.8
			Other technical services	19.8
			Plant engineering	15.5
			Plant maintenance	4.3
			Employment and worker dispatching services	46.7
			Employment services	5.6
			Employment services	5.6
			Worker dispatching services	41.1
			Dispatch of professional and engineering workers	16.0
			Dispatch of clerical and sales workers	14.1
			Dispatch of manufacturing and logistics workers	11.0

## Classification and Weights (Cont'd)

Major group	Group	Subgroup	Item	Weights
			Other services not included elsewhere	105.1
			Training and development services	4.2
			Employee training and development services	4.2
			Health and hygiene	6.9
			Health and hygiene	6.9
			Building maintenance	49.0
			Building cleaning services	33.0
			Facility management services	9.7
			Sanitation services	6.3
			Security services	16.9
			Security services (except Alarm monitoring services)	12.6
			Alarm monitoring services	4.3
			Call centers	4.0
			Call centers	4.0
			Hotels	10.0
			Hotels	10.0
			Meal supply services	6.2
			Meal supply services	6.2
			Laundry services	7.9
			Ordinary laundry services	0.8
			Linen supply	7.1

[Reference] Contract currency basis

Major group	Group	Subgroup	Item	Weights
			Transportation and postal activities	158.0
			Marine freight transportation	20.0
			Ocean freight transportation	7.6
			Ocean freight transportation (except Ocean tankers)	5.4
			Ocean tankers	2.2
			Air freight transportation	1.4
			International air freight transportation	1.0
			International air freight transportation	1.0

[Reference] All items (excluding International transportation)

Item	Weights
All items (excluding International transportation)	989.5
Transportation and postal activities (excluding International transportation)	147.5
International transportation	10.5

## Classification and Weights (Cont'd)

### 2. Reference indexes

#### Wholesale Services Price Index

Item	Weights
All items including Wholesale trade	1239.6
All items including Wholesale trade (excluding International transportation)	1229.1
Wholesale trade	239.6
Wholesale trade (Textile and apparel)	11.5
Wholesale trade (Food and beverages)	45.7
Wholesale trade (Building materials, minerals & metals, etc.)	63.0
Wholesale trade (Machinery and equipment)	63.9
Wholesale trade (Miscellaneous goods)	55.5

#### Services Export Price Index

Item
Yen basis
Ocean freight transportation (Yen basis)
International air freight transportation (Yen basis)
Intellectual properties licensing (Yen basis)
Intellectual properties licensing (Transportation equipment) (Yen basis)
Intellectual properties licensing (except Transportation equipment) (Yen basis)
Contract currency basis
Ocean freight transportation (Contract currency basis)

#### Services Import Price Index

Item
Yen basis
International air passenger transportation (Yen basis)
Ocean freight transportation (Yen basis)
Oceangoing ship chartering services (Yen basis)
Intellectual properties licensing (Yen basis)
Contract currency basis
Ocean freight transportation (Contract currency basis)
Oceangoing ship chartering services (Contract currency basis)

#### Item used for calculating the Basic grouping index

Item
Leasing
Lease rate
Building maintenance
Building cleaning services (for private sectors)
Building cleaning services (for public sectors)
Facility management services (for private sectors)
Facility management services (for public sectors)
Security services
Security services (except Alarm monitoring services) (for private sectors)
Security services (except Alarm monitoring services) (for public sectors)

#### Services Producer Price Index excluding Consumption Tax

The structure, classification, and weights are identical to those of the Basic grouping index except that there are no Contract currency basis series.

#### Wholesale Services Price Index excluding Consumption Tax

The structure, classification, and weights are identical to those of the Wholesale Services Price Index.