BOJ Reports & Research Papers

February 2017

Rebasing the Corporate Goods Price Index to the Base Year 2015

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

Research and Statistics Department
Bank of Japan

February 3, 2017
Research and Statistics Department
Bank of Japan

Rebasing the Corporate Goods Price Index to the Base Year 2015

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

Executive Summary

The Bank of Japan plans to begin monthly releases of the Corporate Goods Price Index (CGPI), whose base year has been updated from the current 2010 to 2015, from February 10, when preliminary figures for January 2017 and revised figures for December 2016 are to be published.

The rebasing of the CGPI focused on the following four themes whose initial purposes have been achieved: (1) incorporating new goods to accurately reflect changes in economic and industrial structures in price indexes; (2) reducing the reporting burden by actively utilizing external statistics/database and incorporating export and import transactions which are conducted without customs and administrative procedures; (3) expanding the scope for applying the *hedonic regression method* and introducing new quality adjustment methods which do not depend on the information from reporting companies; and (4) with the restrictions on basic materials, realizing a timely rebasing using alternative data for the calculation of weights.

The number of commodities in the new index will change from the current 1,286 commodities to 1,213 commodities. The coverage of the adopted commodities (the transaction value of adopted commodities divided by the total transaction value used in the calculation of weights) increases from 81.6 to 82.9 percent for Producer Price Index (PPI) and from 68.2 to 70.5 percent for Export Price Index (EPI), while decreasing from 77.9 to 75.5 percent for Import Price Index (IPI). The number of sample prices will be 8,607, almost the same as 8,792 under the current base.

In the revision of the quality adjustments methods, due in particular to the expanded application of the *hedonic regression method* to motor vehicles and television receivers, as well as the new application of the *webscraped prices comparison method* to home electric appliances, the levels of these indexes have changed to some extent. The ratio of commodities using external statistics/database has increased; in particular, they now

account for about 20 percent of the total for the IPI, which includes many products linked with market conditions. Moreover, revisions of price survey methods have been steadily promoted to adjust the composition of sample prices and to reflect market prices by replacing about one-quarter of all sample prices. The comparison of the old and new indexes shows that their index levels and differences in year-on-year changes are small. Under the new index, the timing of scheduled retroactive revisions will be brought forward by one month from the current practice to early March and early September.

The Bank will continue striving to revise price statistics uninterruptedly in the future by closely exchanging views with companies that cooperate for the surveys and with users.

1. Introduction

The Research and Statistics Department of the Bank of Japan (hereinafter, the Bank) has announced the rebasing of the CGPI[1], updating its base year from the current 2010 to 2015. This article presents an overview of the results of this rebasing. The Bank plans to begin monthly releases of the 2015 base CGPI ("new index") in lieu of the current 2010 base CGPI ("old index") from February 10, when preliminary figures for January and revised figures for December of last year are to be published.

The rebasing of the CGPI, which is conducted once every five years, consists of the following revisions: updating the base year (the year whose index level is 100); updating the weights assigned to commodities and groups; amending commodities (e.g., by adopting new commodities; deleting, splitting, and consolidating existing commodities); and improving index compilation methods, including price surveys and quality adjustments. Such revisions aim to improve the accuracy of the statistics by properly reflecting the effects of changes in the economy and structure of the industry in recent years.

For the rebasing, the Bank published the *Basic Policy* (available only in Japanese) in December 2015 to widely solicit opinions, and after taking into account precious opinions and proposals from every point of view, published the *Final Draft* (available only in Japanese) in October 2016. As priority themes for the rebasing, the Bank listed four points: (1) **response to changes in economic and industrial structures**; (2) **initiatives for improvement in accuracy of indexes and reduction of reporting burden**; (3) **improvement of quality adjustment methods**; and (4) **changes in the calculation of weights** (Chart 1). For the new index prepared along with the above themes, this article presents the compilation of commodity classification, the results of calculation of weights, and its characteristics.

The Bank has successfully sped up the rebasing process due mainly to the revision of weight calculation methods. Consequently, the new index is made available to all public users five months earlier than the previous rebasing five years ago, and ten months earlier than the rebasing ten years ago[2]. In addition, regarding the changes of the timing

[1] The CGPI is the collective term for the three basic grouping indexes, PPI, EPI, and IPI. The PPI generally corresponds to the global standard in that it covers domestically-produced and domestically-traded goods in the corporate sector, and is compiled in principle by surveying prices at the time of shipment in the producer stage.

[2] The CGPI is widely used as the deflator (data for calculating the real value by eliminating price factors from the nominal value) for *National Accounts* and *Indices of Industrial Production*. In accordance with the concept of the Statistics Act, the Bank has the policy of contributing to the

to implement scheduled retroactive revisions of the CGPI, which was requested by the Cabinet Office (to bring them forward from April and October of every year to March and September), since it is confirmed such measures will have a minimal impact on the magnitude of retroactive revisions of commodities and the index for all commodities, it will be implemented with the new index, to contribute to facilitate to compiling public statistics.

The new index is explained in the following sections: basic framework (section 2), results of revisions in the rebasing and trends of indexes (section 3), comparison of the old and new indexes for all commodities and breakdown of differences (section 4), and changes of the timing for scheduled retroactive revisions (section 5).

2. Basic Framework of the New Index

2-1. Changes in the Number of Commodities and Coverage

For starters, an overview of changes in the number of commodities for the various indexes is presented[3]. The total number of commodities in the new index decreases from 1,286 commodities to 1,213 commodities (a decrease of 73 commodities), changing from 822 commodities in the old index to 746 commodities for the PPI (a decrease of 76 commodities), from 210 commodities to 209 commodities for the EPI (a decrease of one commodity), and from 254 commodities to 258 commodities for the IPI (an increase of four commodities) (Chart 2(1)). It is affected by, for example, a substantial decrease in domestic production due to progress in domestic manufactures' transfer of production overseas and import substitution, which led to the consolidation of many commodities for which the continued price surveys became difficult.

In principle, commodities are added or deleted based on the value of transactions as of the base year (2015 for the current rebasing). Taking the PPI as an example, the total value of transactions to be used as the denominator for weight calculations called "the

---

improvement in the accuracy of public statistics, and closely cooperating with relevant statistical offices. For further details, see Bank of Japan (2009) "Bank of Japan's Basic Principles for Statistics: 'The Basic Principles for the Compilation, Release, and Development of Statistics' and Present Priorities in the Development of Statistics."

[3] In the CGPI, price data surveyed from companies are called sample prices, while the minimum unit for publication compiling them is referred to as a commodity. In this article, adopting new commodities; deleting, splitting, consolidating existing commodities; expanding and reducing the scope to cover; and changing the labelling are collectively referred to as amending commodities. On the other hand, revising composition of sample prices means changing sample prices within commodities, changing price survey methods, and revising the number of sample prices. Therefore, amending commodities is different from revising composition of sample prices.

Total Transaction Value for the Index," JPY 215 trillion, is calculated by deducting the value of export in the *Trade Statistics of Japan* by the Ministry of Finance from the value of manufactured goods shipments in the *Census of Manufacture (Report by Commodity)* by the Ministry of Economy, Trade and Industry. The threshold for including individual commodities in the index is a transaction value of 1/10,000th of the Total Transaction Value for the Index (JPY 21.5 billion). As a general rule, an existing commodity is deleted if it falls below the threshold and a new commodity is added in the index if it exceeds the same threshold. Similarly, for the EPI and IPI, the threshold for including individual commodities in the index is a transaction value of 5/10,000th of the Total Transaction Value for the Index calculated based on the *Trade Statistics of Japan* (for export: about JPY 34.3 billion; for import: about JPY 36.9 billion)[4] (Chart 2(2)).

The total transaction value of all the commodities included as a percentage of the Total Transaction Value for the Index is referred to as the coverage. When the coverage for the new index is compared to that for the old index, it increases from 81.6 to 82.9 percent for the PPI, and from 68.2 to 70.5 percent for the EPI (Chart 2(3)). As seen in the next section, adding new commodities with large transaction values contributed to the increase in the coverage, while for commodities with substantially decreased transaction value, efforts were made to consolidate them with similar commodities in order to limit the decrease in the coverage. On the other hand, the coverage of the IPI decreases from 77.9 percent for the old index to 75.5 percent. The main reason is that the transaction value of some commodities related to natural resources has decreased, reflecting the drop in global commodity prices.

2-2. Changes in Group Weights

The classification of basic grouping indexes with the base year of 2015 follows the *Japan Standard Industry Classification*, and there has been no change from the current practice except for the changing of the labelling of some groups to improve consistency with other public statistics (Chart 3). The changes in weights in this rebasing are caused by changes in economic and industrial structures and commodity prices fluctuations (Chart 4).

[4] However, if it is expected to be difficult to continue surveying until the next rebasing due to a decline in domestic production or progress in oligopolization, commodities may be deleted even if their transaction value as of the base year still exceeds the threshold. By contrast, a commodity exceeding the threshold but not included because of difficulties in surveying them may be added as a result of improved price surveying methods, e.g. "Steel ships" in the EPI.

In the PPI, weights increased for “Electric power, gas & water” which showed substantial increases in electric power charges, due to a rise in fuel prices in addition to the suspended operation of nuclear power plants and the substituting operation of thermal power plants upon the Great East Japan Earthquake; and for groups such as “Production machinery” and “Transportation machinery” that include many commodities for which Japanese companies are maintaining technological superiority. By contrast, weights decreased for IT-related groups such as “Information & communications equipment” and “Electronic components & devices” in light of the transfer of production overseas and increased presence of foreign companies.

In the EPI, the weight for “Transportation equipment” increased substantially. It is due to the steady export of passenger cars such as hybrid cars and clean-energy cars, in addition to the effects of incorporating “Steel ships” with large transaction value in the new index. On the other hand, the weight decreased for “Electric & electronic products” due to the decline in domestic production caused by the transfer of production overseas.

In the IPI, strongly influenced by the substantial drop in global commodity prices from the summer of 2014 to the first half of 2016, weights decreased for such groups as “Petroleum, coal & natural gas” for which the transaction value of “Crude petroleum” and “Liquefied petroleum gas” substantially dropped; and “Metals & related products” for which the transaction value of “Iron ores” declined.

3. Results of Revisions in the Rebasing and Trends of Indexes

3-1. Commodities Amending

As shown in the *Final Draft*, in the current rebasing, commodities were amended, reflecting structural changes in the Japanese economy and industries, including the production of new goods due to changes in demand and technological innovations, sluggish domestic production and an increase in imports caused by the progress in Japanese companies’ transfer of production overseas and declined competitiveness (Charts 5 and 6). The following sections examine details and price trends.

Newly Added Commodities

Centered on the four key phrases of (1) **technological innovations in Motor vehicles**, (2) **environmental technologies (excluding Motor vehicles)**, (3) **aging and health promotion**, and (4) **technologies for which Japanese companies have an advantage**, the rebasing added as new commodities goods which have reached a certain volume of

transaction, or whose transactions are expected to increase in future. Moreover, goods with increased import, due to (5) **the progress in transfer of production overseas and import substitution**, were also added as new commodities in the IPI.

Specifically, for (1), “Radar apparatus & radio remote control apparatus and radio navigational aid apparatus for cars” (the transaction value of commodity: JPY 181.4 billion) and “Lifesaving & protective goods,” (JPY 94.6 billion) whose import value has been increasing due to the progress in the transfer of production overseas by domestic manufactures, in the midst of continued functional improvements of products brought by technological innovations in motor vehicles, were added in the IPI. Moreover, while not a newly added commodity, there is the example of “Clean energy vehicles” which was established by splitting a commodity, taking into account the spread of plug-in hybrid and electric vehicles.

For (2) environmental technologies (excluding Motor vehicles), in addition to adding “Fuel cells,” (JPY 33.3 billion) which is expected to expand markets through the spread of household fuel cell systems, etc., in the PPI, “Steam & gas turbines,” (JPY 74.3 billion) for which export is increasing in light of robust demand for highly efficient thermal electric power generation systems was added in the EPI, and “Bio-ETBE,” (ETBE stands for Ethyl Tertiary-Butyl Ether) (JPY 62.4 billion), a biomass fuel ingredients originating from bioethanol which is expected to reduce CO_2 emission and petroleum oil consumption, was added in the IPI.

For (3) aging and health promotion, in light of heightened awareness of health promotion, “Non-alcoholic beverages” (JPY 65.6 billion) and “Agents affecting digestive organs” (JPY 142.9 billion) were added in the PPI and IPI, respectively; while “Electromedical equipment” (JPY 129.7 billion) such as Magnetic Resonance Imaging (MRI) equipment, the demand for which has been increasing due to the sophistication of medical care, was adopted in the IPI.

For (4) technologies for which Japanese companies have an advantage, “Magnetic parts” (JPY 82.8 billion) which is soft magnetic components used for industrial equipment and electric parts of motor vehicles and “Butadiene” (JPY 65.9 billion) which is mainly used as raw materials for synthetic rubbers for motor vehicle tires were added in the PPI. At the same time, “Disposable diapers” (JPY 180.4 billion) which is seeing an increasing demand mainly in Asia for high-quality Japanese products, “Piezoelectric ceramic devices & filters” (JPY 149.7 billion) necessary for reducing the size of and saving power of smartphones, and high-quality “Rails” (JPY 59.3 billion)

made in Japan which is expected to increase export with new construction of high-speed railways overseas were added in the EPI.

For (5) the progress in transfer of production overseas and import substitution, “Frozen precooked foods” (JPY 261.3 billion) which is expanding markets reflecting an increase in single-person households and advances of working women, as well as “LED lamps” (JPY 62.4 billion) and “General-purpose internal combustion engines” (JPY 43.0 billion) which are seeing an increase in import with the progress in the transfer of production overseas were added in the IPI. Moreover, “Semi-finished common steel products” (JPY 180.1 billion) which is seeing an increase in export of intermediate goods as a result of the vertical specialization and transfer of production overseas of the final manufacturing process is adopted in the EPI.

In addition, “Motor vehicles for special-use” (JPY 231.6 billion) such as truck mixers and dump trucks and “Construction tractors & parts” (JPY 68.1 billion) for which transaction values are increasing due to construction demand for recovery after earthquakes and for the Tokyo Olympic Games were added in the PPI, while “Steel ships” (JPY 1,327.8 billion) which has large transaction value in order to fulfil the demands for deflators was added in the EPI.

The trends of indexes of newly added commodities show that prices of highly general purpose commodities, which face global competition, tend to decline (Chart 7). For example, prices of the PPI “Fuel cells” and the IPI “LED lamps” declined partly due to improvement of process yield rates. Moreover, for “Disposable diapers,” “Piezoelectric ceramic devices & filters,” and “Rails” in the EPI, the yen basis export prices substantially declined partly owing to the effects of a strong yen and weak local currencies since 2016, in addition to intensified competition. While the market size of newly added commodities is expanding, technological innovations and intensified competition in Japan and abroad appear to have contributed to lowering prices.

Expanded Commodities

Goods with conspicuously expanding transaction volumes, while having not reached a transaction volume large enough to be adapted as a newly added commodity, were incorporated into the price index by expanding the scope for survey of the existing commodities. For example, in relation to (4) technologies for which Japanese companies have an advantage, the scope of survey for the existing PPI commodity “Aircraft engine parts” was expanded to “Aircraft parts” in order to incorporate aircraft structural parts for which domestic production is increasing by being incorporated into

global supply chains (Chart 8(1)). Moreover, from the perspective of (4) above and (3) aging and health promotion, the existing PPI commodity “Industrial robots” was expanded to the wider “Robots” in order to include robots for logistics and nursing care, whose markets are expected to grow in future with the furthering of the aging society with fewer children, in the scope of surveys (Chart 8(2)), while the EPI also expanded the existing commodity “Glass substrates & cover glass” to “Glass substrates & applied products” by incorporating color filters, etc. made in Japan with an established reputation for high quality (Chart 8(3)).

Split Commodities

Moreover, some commodities were split in order to more accurately capture the trends of their prices. In (1) “technological innovations in Motor vehicles,” in light of the spread of plug-in hybrid vehicles and electric vehicles, the PPI subdivided the composition of four commodities “Mini passenger cars,” “Small passenger cars (except hybrid cars),” “Standard passenger cars (except hybrid cars),” and “Hybrid cars” into six commodities: “Mini passenger cars,” “Small passenger cars (gasoline cars),” “Small passenger cars (hybrid cars),” “Standard passenger cars (gasoline cars),” “Standard passenger cars (hybrid cars),” and “Passenger vehicles (clean energy vehicles).” As a result, reflecting the difference in consumer criteria for assessing economic efficiency and practicability, the new index clarified that there is a difference in the trends of prices for Small passenger cars and Standard passenger cars even if they are the same hybrid ones (Chart 9(1)).

Furthermore, the difference in price trends by demander became clear for the PPI “Lithium ion batteries” and the IPI “Electric luminaries” by splitting commodities into “for motor vehicles” and “except for motor vehicles” (Charts 9(2) and (3)). In other areas, it has become possible to ascertain the difference in index trends for each commodity by splitting the existing PPI commodity “Plastic containers for items other than drinks” into “Plastic hollow containers” and “Plastic containers (except plastic hollow containers),” and the IPI “Discrete semiconductors” into “Photoelectric converter devices” and “Semiconductor devices” (Charts 9(4) and (5)).

Consolidated and Deleted Commodities

Commodities are in principle consolidated or deleted if continued price surveys become difficult to complete due to a reduction in domestic production or other factors, and their value of transactions in 2015 is below the threshold for individual commodities. While facilitating the adoption of new commodities in the IPI, (5) the

progress in the transfer of production overseas and import substitution is a factor in consolidating and deleting commodities in the PPI.

For example, the existing PPI commodities “Photographic film,” “Sensitive materials for photoengraving,” and “Chemicals for photography” were consolidated into “Photosensitive materials” partly due to the reduction in domestic production of film-camera related products in light of the shift in demand to digital cameras and smartphones. In addition, the EPI “Internal combustion gasoline engines for industry” and “Internal combustion diesel engines for industry” were consolidated into “General-purpose internal combustion engines” in light of the decline in domestic production and export due to the transfer of production overseas. Furthermore, the PPI “Zinc die-casting” and “Microwave ovens” as well as the EPI “Terephthalic acid” and “Acrylonitrile” were deleted, for the same reasons.

3-2. Revisions of Quality Adjustment Methods

Track Record of Applications

The rebasing tries to expand quality adjustment methods which do not rely on information from reporting companies, given the situation in which it is becoming increasingly difficult to determine the cost information of survey products from reporting companies. The target commodities for application of the *hedonic regression method* were reviewed to expand the application to each product of passenger cars, smartphones, and LCD Televisions (Chart 10(1))[5]. Moreover, four new quality adjustment methods were introduced, namely, the *attribute cost adjustment method*, the *option cost method*, the *fuel efficiency method*, and the *webscraped prices comparison method* (Chart 10(2))[6]. Among these new quality adjustment methods, the *attribute cost adjustment method* is applied to “Servers;” the *option cost method* and *fuel efficiency method* to each commodity of Motor vehicles, including not only “Passenger cars” but also “Buses” and “Trucks;” and the *webscraped prices comparison method* to a wide

[5] Assuming that part of price differences among commodities are caused by differences in quality which can be measured by various common attributes shared by these commodities, the *hedonic regression method* quantitatively estimates by regression equations the part for “changes in prices corresponding to changes in quality” from changes in various attributes of commodities, then processes the remainder as the “pure changes in prices.” See the references of this article for the details of the *hedonic regression method* to be applied from the rebasing to each product of passenger cars, smartphones, and LCD televisions.

[6] When actually conducting quality adjustments, the accuracy of indexes will be maintained or improved by firmly adhering to priorities, i.e., to apply first the adjustment method which is deemed to be the most accurate; and only if it is deemed inappropriate to apply such method, to consider, as the second-best solution, the application of other methods which are less accurate (Chart 10(3)).

range of commodities related to household electric equipment (Chart 11).

Under the new index (January 2015 – October 2016), the revised quality adjustment methods are used to 34 commodities for the *hedonic regression method* (applied to passenger cars, smartphones, and LCD televisions), two for the *option cost method* (applied to motor vehicles), eight for the *fuel efficiency method* (applied to motor vehicles), and 15 for the *webscraped prices comparison method* (applied to household electric equipment) (Charts 12(1) and (2)). As a result, under the new index, quality adjustments can be conducted for about four out of ten cases where the implementation of quality adjustments could not be possible under the old index among Motor vehicles and Household electric equipment (Chart 12(3)).

Impact on Commodity Indexes

The following section examines the impact of revised application of such quality adjustment methods on commodity indexes for commodities under Passenger cars, Cellular phones, and Television receivers.

For “Passenger cars,” commodity indexes of producer prices have shifted downward led mainly by hybrid cars, because revisions of quality adjustment methods made quality improvement by model changes easier to be reflected. However, the magnitude of such changes remains small at less than 1 percentage point for each case (Chart 13(1)). For “Cellular phones,” the commodity index of producer prices shifted downward by about 3 percentage points, because the improvement in quality was reflected by the application of the *hedonic regression method* (Chart 13(2)). For “Television receivers,” while the commodity index of import prices also shifted downward, the commodity index of producer prices saw the new index shifting upward by about 5 percentage points, because a rise in the nominal price was larger than the improvement in quality measured by the *hedonic regression method*, reflecting substantive price increases by manufactures to the index (Chart 13(3)).

As seen above, certain changes have occurred in indexes for commodities for which revisions of quality adjustment methods were applied. There previously were cases for which changes in quality between the old and new products could not be properly assessed, and were therefore assumed to be at the same level. For some of these cases, under the new index, the implementation of quality adjustments has become possible due to the expanded application of the *hedonic regression method* and the introduction of new quality adjustment methods. Revisions of quality adjustment methods in the rebasing can be seen as useful endeavors to improve the accuracy of indexes.

3-3. Expanded Use of External Statistics/Database

Commodities Using External Statistics/Database and Their Shares

Aiming to improve the accuracy of indexes and reduce the reporting burden of companies, the rebasing facilitated the further utilization of external statistics/database (statistics and external database prepared by other organizations) (Chart 14). Specifically, external statistics/database are introduced for five commodities such as “Benzene,” “Concrete pipes,” and “Brown rice” in the PPI, nine commodities such as “Para-xylene,” “Steel ships,” and “Gas oil” in the EPI, and 13 commodities such as “Iron ores,” “Naphtha,” “Coal for coke making,” and “Liquefied natural gas” in the IPI.

As a result, the share of commodities using external statistics/database, calculated by totaling their weights (rate per thousand), shows a substantial increase, from 42.6 under the old index to 53.8 under the new index for the PPI; from 69.0 to 116.4 for the EPI; and from 64.2 to 194.4 for the IPI (Chart 15). For the IPI in particular, the composition ratio of commodities using external statistics/database increased to almost 20 percent. It was partly affected by the existence of many products linked with market conditions for which external statistics/database are relatively easy to use, including “Liquefied natural gas,” “Naphtha,” and “Iron ores.”

Trends of Indexes for Commodities Introducing External Statistics/Database

The trends of indexes for commodities introducing external statistics/database show similar movements with those under the old indexes for many commodities (Chart 16). Since the purpose of introducing external statistics/database was to maintain and improve the accuracy of indexes while reducing the reporting burden, it has achieved the initially intended result to have small price differences between the old and new indexes. One of the reasons for small price differences between the old and new indexes was that newly introduced commodities from such external statistics/database include many products linked with market prices for which law of one price is easily applied.

For two PPI commodities, “Prestressed concrete products” and “Concrete pipes”, there are some differences in the movements between the old and new indexes. This is because prices of commodities differ among regions according to differences in supply and demand. Thus there were noises in the old index due to the limited number of sample prices. However, the external statistics, *Construction & Material Costs in Japan* by Construction Research Institute, contains many samples and covers wide areas, noises in indexes have disappeared, which in turn is expected to improve accuracy.

While examining whether trends in indexes of commodities using external statistics/database are different from the actual situation, the Bank strives to further utilize external statistics/database, aiming to improve the accuracy of indexes and to reduce the burden of reporting companies and of the Bank in preparing price statistics.

3-4. Improvement in Accuracy of Commodity Indexes: Adjustments of Sample Price Composition and Grasp of Market Prices

Overview of Sample Price Revisions

In the rebasing, replacement of sample prices and revisions of price survey methods were conducted, focusing on the following three points, aiming to further improve the accuracy of indexes:

First, the composition of sample prices was adjusted in accordance with the kinds of goods and actual situation of transaction routes. Adjustment of the price composition is essential to improve the accuracy of indexes, given the wide-spread price discrimination which offers a different price for high-value-added and differentiated goods for each transaction route.

Second, in response to the more complex price-setting by companies, price survey methods, which do not necessarily reflect the actual transactions such as invoice prices and list prices, were changed to those more closely reflecting market prices. In the process, efforts were made to acquire market prices by, for example, making the establishment of commodity ranges to be surveyed stricter for sample prices with noises which do not reflect market prices.

Third, unification of the stage and timing of price collection was further implemented, considering the role of the CGPI to be used as a deflator. In principle, prices are unified as much as possible to those at the time of shipment in the producer stage for the PPI, while those at the time of cargo loading and unloading in the custom clearance stage for the EPI and IPI.

Trends of Indexes after Revisions of Sample Prices

As a result of revisions in accordance with the above policy, the number of sample prices under the new index has become 8,607, which is almost the same as 8,792 under the old index (Chart 17(1)). Nonetheless, the replacement of sample prices, which is essential for the improvement in accuracy of indexes, was conducted, such as adopting 2,026 new sample prices, which accounted for about one-fourth of the all sample prices

(Chart 17(2)). Price survey methods were also changed to those which would better reflect market prices (Chart 17(3)).

Next, specific results of sample price revisions are discussed. (1) **Adjustment of the composition of sample prices**: For "Passenger cars" which accounts for a large weight in the EPI, the composition of sample prices was adjusted so that the composition ratio of export destinations by region is consistent with that of export value by region in 2015 based on the *Trade Statistics of Japan* (Chart 18(1)). As a result, the ratios for developed countries such as European countries decreased while those for emerging countries such as in the Middle East and Russia increased, reflecting the sluggish export to Europe due to the progress in local production and an increasing trend of export of locally popular Japanese SUVs to the Middle East. In response, the new index of "Passenger cars" was revised upward due to a rise in the ratio for emerging countries which saw relatively small decreases in export prices (Chart 18(2)).

As other cases of adjusting the composition of sample prices, the composition ratios by product type for "Paper kraft pulp" in the PPI, and the composition ratios between regular selling prices and agreed-upon prices for specific firms, which differ in price trends and revision frequencies, for steel-related commodities such as "Hot-dip zinc-coated steel sheets" were revised, improving the accuracy of indexes (Charts 19(1) and (2)). Moreover, for "Electric meters," efforts were made to reflect market prices by incorporating many sample prices responding to all-out replacement to smart meters upon the revision of the Energy Saving Act (Chart 19(3)). For "Light steel bars," in addition to changes of the price survey stage mentioned below, the composition ratios by region were updated (Chart 19(4)). Furthermore, similar revisions were also made in the EPI and IPI. In the EPI, changes in the export composition in recent years due to the transfer of production overseas by manufactures in Japan were appropriately reflected in "MOS integrated circuits (except MOS memory integrated circuits)" and "Glass substrates & applied products" (Chart 19(7) and aforementioned Chart 8(3)). In the IPI, revisions were made for "Cellular phones" to adjust the shares of manufactures, "MOS memory integrated circuits" to change the composition ratios between general-purpose and made-to-order products, "Medical supplies" to adjust the product composition to be consistent with the composition ratio in the *Statistical Survey on Trends in Pharmaceutical Production* by the Ministry of Health, Labour and Welfare (Charts 19(8), (9), and (10))[7].

[7] In the rebasing, fuels ships and aircrafts operated by Japanese companies loaded at ports and airports, i.e. external trade transactions not through customs clearance, were included in the scope of surveys. As a result, index trends of "Jet fuel oil & kerosene" and "Fuel oil C" have changed.

(2) **Revisions of price survey methods to reflect market prices**: Revisions of price survey methods were made for "Mold, die & parts," which adopts profit margin surveys, to make correspondence relation more appropriate between each product's estimated cost and profit margins obtained from sales in order to restrain noises which do not appropriately reflect market prices (Chart 19(5)). Moreover, for "Steelworks" which adopts average price surveys, the accuracy was improved by increasing the quality-fixed ratios and raising contract frequencies of transactions through the revision of regions and weight classification which become the standards for grouping of products (properties) to be surveyed (Chart 19(6)). Similarly, for "Metal valves" in the IPI, the accuracy was raised by increasing the quality-fixed ratios in average price surveys (Chart 19(11)).

(3) **Unification of the stages and the timing of price collection**: As a result of revisions, the ratios at the producer stage and the time of shipment in the PPI, those at the time of cargo loading in the EPI, and those at the time of cargo unloading in the IPI rose compared to those under the old index (Chart 20). In particular, the ratio of the producer stage has reached to 95 percent as the stage of price collection of the PPI, further reinforcing the characteristics of the CGPI as the Producer Price Index in this respect. The CGPI has become capable of responding more appropriately to the needs of using it as a deflator.

On the other hand, there are some cases where changes in the stage and timing of price collection had a certain impact on changes in indexes. For example, in the above-mentioned "Light steel bars," the change of the stage of price collection from wholesale to producer led to the change in index trends due to the influence of widely fluctuating prices at the producer stage (aforementioned Chart 19(4)). In the EPI and IPI, moreover, the timing of developments in indexes has changed for some commodities, such as "Unwrought gold" for the EPI, and "Iron ores," "Unwrought gold," "Unwrought platinum," and "Unwrought palladium" for the IPI, due to the unification to the time of cargo loading and unloading.

4. Comparison of Old and New Indexes and Breakdown of Differences

4-1. Producer Price Index

Comparison of Old and New Indexes

While comparing developments in the new indexes with those in the old indexes, this section breaks down differences in the old and new indexes. First, after modifying the

base year of the old indexes so that the level of 2015 is equal to 100, differences between the old and new indexes are very small during the period from January 2015 to October 2016 for which both can be compared (Chart 21(1)). Next, comparison of the year-on-year changes between the old and new indexes shows that the rate of change in the new index is slightly below that in the old index. Comparison of the differences during the ten months from January to October 2016 which can be compared shows that the year-on-year changes in the new index have been on average about 0.1 percentage point lower than that in the old index (Chart 21(2)).

Breakdown of Difference between Old and New Indexes

The difference in the year-on-year changes between the new index and the old index can be broken down into four factors: the *weight effect*, the *reset effect*, the *commodity amendment effect*, and the *commodity index revision effect* (Chart 22). (1) The *weight effect* refers to the contribution of changes in the weights assigned to certain commodities. (2) The *reset effect* refers to the contribution of resetting the price index for individual commodities to 100 for the new base year. (3) The *commodity amendment effect* refers to the contribution of changes resulting from the addition or deletion of commodities. (4) The *commodity index revision effect* refers to the contribution of changes resulting from revisions of sample prices of existing commodities, e.g. switch to external statistics/database, application of new quality adjustment methods, changes of price survey methods, etc.

Most of the difference in the year-on-year changes between All commodities of the new index and that of the old index can be explained by the *weight effect* and the *reset effect*[8]. Conducting a breakdown of the difference in the year-on-year changes during the period from January to October 2016 (minus 0.1 percentage point) shows that: the *weight effect* (minus 0.30 percentage point) was the greatest, most of it was offset by the *reset effect* (plus 0.24 percentage point), and the total of those two effects slightly lowered the year-on-year changes (Chart 23(1)). On the other hand, whereas the *commodity amendment effect* (minus 0.00 percentage point) had a negligible contribution, the *commodity index revision effect* (minus 0.09 percentage point) lowered the year-on-year changes to a certain extent[9].

[8] Most of the difference between the chain-weighted PPI, which is prepared by updating the base year and weights every year, and the old index, can also be explained by these two effects. Accordingly, the chain-weighted Laspeyres index and the new index show relatively similar movements (Chart 21(2)).

[9] At the previous rebasing of indexes, the difference in the year-on-year changes in All commodities of the old index during the period from January 2011 to April 2012 was minus 0.5 percentage point

Contributions of Weight and Reset Effects

Conducting a similar breakdown for the indexes for commodity groups shows that for "Electric power, gas & water" both the negative *weight effect* and the positive *reset effect* contributed substantially, making the largest contribution among commodity groups (Chart 23(2)). For this commodity group, the weight in the new index increased substantially because demand would not decrease significantly despite the substantially increased prices. On the other hand, the *weight effect* became negative (minus 0.30 percentage point) due to the substantial decrease in indexes caused by the decline in the unit price of thermal power fuels in the subsequent period. By contrast, since the old index level substantially exceeded 100, the *reset effect*, from resetting it so that the level in 2015 was equal to 100 for the new index, became positive (plus 0.29 percentage point). Both effects were offset, resulting in the total contribution of almost zero.

For "Petroleum & coal products" which is the second largest contributor, although both the *weight effect* (minus 0.04 percentage point) and the *reset effect* (minus 0.02 percentage point) are smaller than those of "Electric power, gas & water," both are making a certain negative contribution. This was due to the negative *reset effect*, which was caused because the old index became substantially below 100 and then was reset so that the level in 2015 was equal to 100, in addition to the negative *weight effect* caused by the recent decline in indexes while its weight increased in the new index. The sum of negative contributions from the weight and reset effects of this commodity group directly caused the decrease in the year-on-year changes.

Contribution of Commodity Index Revision Effects

By contrast, while *commodity index revision effects* (minus 0.09 percentage point) pushed down the year-on-year changes to some extent, their contribution by commodity type shows that "Transportation equipment" and "Iron & steel" contributed substantially (Chart 23(3)). For "Transportation equipment," expansion of the scope for commodities of "Aircraft parts" and the improved quality adjustments, i.e. expanded application of the *hedonic regression method*, for "Standard passenger cars (hybrid cars)" caused the downward shift (aforementioned Chart 13), while for "Iron & steel," the revision of sample prices of "Light steel bars" discussed beforehand (recall Chart 19(4)). As seen above, various revisions for sample prices and quality adjustments in the rebasing contributed to the movements of the index to some extent.

---

on average. The difference consisted of the *weight effect* (plus 0.25 percentage point), the *reset effect* (minus 0.67 percentage point), the *commodity amendment effect* (minus 0.04 percentage point), and the *commodity index revision effect* (minus 0.02 percentage point).

4-2. Export Price Index

Comparison of Old and New Indexes

Similar developments were observed by the comparison between the old index, with the base year modified so that the level in 2015 was equal to 100, and the new index (Chart 24(1)). Comparing the year-on-year changes (yen basis), the new index slightly exceeds the old index (Chart 24(2)).

Breakdown of Difference between Old and New Indexes

A breakdown of difference in the year-on-year changes during the period from January to October 2016 (plus 0.7 percentage point) shows that the *weight effect* (plus 0.58 percentage point) contributed the most in pushing them up, followed by the positive contributions by the *commodity index revision effect* (plus 0.22 percentage point) and the *reset effect* (plus 0.15 percentage point) (Chart 25(1)). By contract, the *commodity amendment effect* (minus 0.29 percentage point) made negative contributions.

Contributions of Weight/Commodity Amendment/Commodity Index Revision Effects

Due to the recent decreases in indexes, the *weight effect* had large positive contributions to commodity groups “Other primary products & manufactured goods,” “Electric & electronic products,” and “Metals & related products” which saw a decline of weights in the new index. By contrast, negative contributions were made to “Transportation equipment” which increased weights substantially (Chart 25(2)).

On the other hand, the *commodity amendment effect* made substantial positive contributions to “Transportation equipment” and “Electric & electronic products.” In “Transportation equipment,” revisions of the composition of export destinations by region (aforementioned Chart 18(1)) as well as revisions of quality adjustments by the application of the *hedonic regression method* (aforementioned Chart 13) contributed to pushing up indexes for individual commodities of “Passenger cars.” In “Electric & electronic products,” revisions of the composition of commodities to be surveyed in “MOS integrated circuits (except MOS memory integrated circuits)” contributed to pushing them up. Moreover, whereas the *commodity amendment effect* was negative, it was due to the decline in indexes of commodities, such as “Gasoline,” “Disposable diapers,” “Semi-finished common steel products,” and “Xylene,” which were adopted in the current rebasing (aforementioned Chart 7-2).

4-3. Import Price Index

Comparison of Old and New Indexes

In the IPI, the old and new indexes also show relatively similar developments (Chart 26(1)). Comparing year-on-year changes (yen basis), the new index slightly exceeds the old index (Chart 26(2)).

Breakdown of Difference between Old and New Indexes

A breakdown of difference in the year-on-year changes during the period from January to October 2016 (plus 1.4 percentage points) shows that the *weight effect* (plus 1.04 percentage points) contributed the most in pushing them up, followed by the positive contributions by the *commodity index revision effect* (plus 0.34 percentage point) and the *reset effect* (plus 0.21 percentage point). By contract, the *commodity amendment effect* (minus 0.30 percentage point) made negative contributions. The pattern of contributions by factor is similar to that of the EPI, despite their somewhat different magnitudes.

Contributions of Weight/Commodity Amendment/Commodity Index Revision Effects

Among them, the positive contribution of “Petroleum, coal & natural gas” accounts for the most of the *weight effect*. The *weight effect* became substantially positive because indexes also fell while the weight of this commodity group in the new index considerably dropped due to the decrease in market prices.

On the other hand, the *commodity amendment effect* made substantial positive contributions to “Electric & electronic products” and “General purpose, production & business oriented machinery.” It is due to revisions of the composition of commodities to be surveyed and price survey methods for “Cellular phones” and “MOS memory integrated circuits” in “Electric & electronic products” and “Metal valves” and “Medical supplies” in “General purpose, production & business oriented machinery.” Moreover, whereas the *commodity amendment effect* was negative, as with the EPI, it was due to the decline in indexes of commodities, such as “Gasoline,” “Frozen precooked foods,” “Agents affecting digestive organs,” and “Radar apparatus & radio remote control apparatus and radio navigational aid apparatus for cars,” which were adopted in the rebasing (aforementioned Chart 7-3).

4-4. Index by Stage of Demand and Use (ISDU) and Input-Output Price Index of the Manufacturing Industry by Sector (IOPI)

The Index by Stage of Demand and Use (ISDU) is compiled by rearranging each commodity of the CGPI by the stage of demand and use of goods. Therefore, the revision of the CGPI affects developments in the ISDU to some extent. Comparison of the old and new indexes for Domestic demand products (Domestic goods and Imports) shows that the new index has been slightly exceeding the old index for raw materials, while somewhat below for final goods (Chart 28).

For the Input-Output Price Index of the Manufacturing Industry by Sector (IOPI)[10], developments in indexes from January 2015 and onward change as well, according to the shift of the CGPI, to be used as price data, from the 2010 base to the 2015 base. Nonetheless, changes in the level of indexes and year-on-year changes remain very small (Chart 29).

5. Changes of the timing for Scheduled Retroactive Revisions

For the old index, scheduled retroactive revisions are conducted twice a year in early April (at the time when preliminary figures for March and revised figures for February are published) and early October (at the time when preliminary figures for September and revised figures for August are published), in order to reflect correct prices to indexes if reporting is delayed from companies, price negotiations are brought forward, and errors in figures are identified after the publication of revised figures[11].

When opinions were widely solicited for the rebasing, the Cabinet Office, which uses the CGPI as a deflator for the *National Accounts*, requested that it would appreciate it if scheduled retroactive revisions could be brought forward by one month for practical reasons in compiling statistics. While the Bank judged that responding to such a request would contribute to facilitate compiling public statistics, its feasibility was carefully examined because there was a possibility for a delay by the inclusion of sample prices which were decided late.

---

[10] Please note that the IOPI itself has the base year of 2011. For further details, see Bank of Japan (2016) "Rebasing the Input-Output Price Index of the Manufacturing Industry by Sector (IOPI) to the Base Year 2011."

[11] However, if corrections due to errors in figures or delays in reporting are deemed to affect developments in indexes, or bring problems for analysis by users of price statistics, corrections are promptly made every time the facts in need of corrections are identified (so-called "unscheduled revisions").

As a result of the examination, it turned out that by advancing the timing of scheduled retroactive revisions, reflection of finalized prices in indexes could be delayed only for one commodity "Fuel oil C" in the PPI (Chart 30(1)). Nonetheless, since the impact of such delay on developments and commodity indexes would be minimal (Chart 30(2)), and in comparison and balance with the merits of earlier scheduled retroactive revisions for other commodities, it was concluded that advancement of scheduled retroactive revisions by one month would have rationale.

Based on this conclusion, in the new index, the timing of scheduled retroactive revisions for the CGPI will be brought forward by one month compared to the current practice, to early March when preliminary figures for February and revised figures for January and early September when preliminary figures for August and revised figures for July. This advancement will be implemented for scheduled retroactive revisions in early March 2017 after the transition to the new index.

6. Final Remarks

The Bank is deeply grateful to the companies cooperating in the collection of price data, to academic experts and economists for valuable comments, and to the government and industrial associations for their suggestions to the rebasing of the CGPI. The Bank will continue its efforts to improve the price statistics, so that they can be understood and utilized by a wider range of the public[12]. The Bank will also continue to use the CGPI as one important factor to assess economic and price developments.

After the rebasing, the Bank will continue its efforts to improve price indexes and respond to the needs of users through the replacement of sample prices and constant reviews of methods for price survey and index compilation. Moreover, the Bank intends to examine the remaining medium-term issues in compiling statistics, while hearing opinions of relevant parties. The Bank would appreciate it if you would continue providing opinions from various perspectives on the Bank's compilation of statistics.

[12] All published data, including indexes suitable for long-term time-series analysis, can be obtained from the "Time-Series Data Search" on the website of the Bank.

BOX 1: Index Compilation Method for Commodity "Steel ships" in the EPI

1. Data to be Used

The index for commodity "Steel ships" in the 2015 base EPI is compiled based on Table 6 of "Each uses and class of gross tonnage, the number and gross tonnage of completed steel ships" in the *Final Report of Shipbuilding Statistics* by Ministry of Land, Infrastructure, Transport and Tourism (Box Chart 1(1)). Regarding steel ships completion for export, necessary data for compiling price statistics such as the number of ships, dead weight tonnage (hereinafter, D/W) of ships, ship price, etc., can be obtained from that table.

2. Index Compilation Method

Calculation of Average Ship Price by Ship Type

(1) Surveyed Ship Type

The following six ship types are surveyed: "Ore/bulk carrier," "Bulk carrier," "Chemical tanker," "Container ship," "Timber/bulk carrier," and "Car carrier." These ship types account for 80 percent or more of the completed ships in the base year 2015.

(2) Average Ship Price by Ship Type and D/W

The ship price per D/W for each ship is calculated by dividing the ship price by the D/W indicator. Then, the average ship price per D/W for eleven categories by ship type and D/W is calculated, taking into account the differences in price developments of each category[13]. Considering the characteristics of hull form; however, the G/T (Gross Tonnage) indicator instead of D/W indicator is used to calculate the average ship price for "Pure car carrier."

(3) Average Ship Price for Each Ship Type

The average ship price per D/W for each ship type is calculated by averaging the average ship price per D/W for each category by ship type and D/W, for each ship type.

Compilation of Commodity Indexes

The price index of commodity "Steel ships" is the weighted average of the average ship price per D/W for each ship type described above, by using the share of actual completions in the base year 2015 (Box Chart 1(3)).

3. Timing of Reflection to the CGPI

The *Final Report of Shipbuilding Statistics* which is necessary for the compilation of price index for "Steel ships," is published in six months after the surveyed month. Accordingly, new data are reflected in the commodity index "Steel ships" twice a year in principle at the time of scheduled retroactive revisions[14]. If the *Shipbuilding Statistics* becomes available earlier in the future, data will also be reflected in the CGPI promptly.

---

[13] By finely categorized by ship type and D/W, it will be possible to control the differences in quality by removing noises which do not appropriately reflect actual prices, which in turn improve the accuracy of indexes (Box Chart 1(2)).

[14] Until new data are reflected in the index at the timing of scheduled retroactive revisions, sample prices of "Steel ships" are regarded as missing prices and imputed by prices used in the previous month.

BOX 2: Results of Paasche Check

The Laspeyres index with fixed weights which fixes weights at the base year, such as the CGPI, is logically known that the more further away prices and transaction volumes are from the base year, the less well the index reflects the reality. If the price of a good drops (rises) while the transaction volume increases (decreases), the Laspeyres index with fixed weights will show stronger movements than the reality.

As stated in this article, the Bank considers it important to combine the chain-weighted Laspeyres index, as one of the means to alleviate such problems. Moreover, in order to understand the magnitude of such problems with the Laspeyres index with fixed weights, a Paasche check is conducted in this BOX. The Paasche check compares the Laspeyres index, with fixed weights under the old index, with the index compiled using weights at the time of comparison (Paasche index).

However, the Paasche check on the rebasing resulted in the difference in the PPI of only minus 0.04 percent, indicating that there is almost no such problem of the Laspeyres index with fixed weights (Box Chart 2(1)). Moreover, the rates of differences in the EPI and IPI (minus 1.5 percent and minus 3.1 percent, respectively) were smaller than those at the time of several rebasing in the past.

The rate of difference between the Paasche index and the Laspeyres index with fixed weights tends to become larger, the wider the dispersion of commodity index levels, i.e. relative price movements among commodities. Accordingly, dispersions in the levels of commodity indexes (old index) are compared between the current rebasing and the previous one, the degree of dispersion has become smaller in terms of either the weighted standard deviation or weighted absolute deviation (Box Chart 2(2)). This is presumably one of the reasons for the rate of differences in the PPI to have become substantially smaller in the Paasche check than the last time.

Charts

Main Features of the Rebasing Corporate Goods Price Index to the Base Year 2015

1. Response to Changes in Economic and Industrial Structures	
Addition of new goods in the Corporate Goods Price Index	・Added goods as new commodities which have reached a certain volume of transaction, or whose transactions are expected to increase in future with the following key phrases: (1) Technological innovations in Motor vehicles (2) Environmental Technologies (excluding Motor vehicles) (3) Aging and health promotion (4) Technologies for which Japanese companies have an advantage
Expansion of the scope for survey of the Import Price Index	・Added goods as new commodities reflecting progress in transfer of production overseas and import substitution ・Expanded the scope for survey range of existing commodities and increased the number of sample prices

2. Initiatives for Improvement of Index Precision and Reduction of Reporting Burden	
Increase in coverage for the Export/Import Price Index	・Adopted commodity "Steel ships" in the EPI ・Included external trade transactions not through customs clearance in the scope of survey
Strategy of setting commodities	・Established commodities robust to changes in economic and industrial structures
Expansion of commodities using external statistics/database	・Utilized external statistics/database such as *Trade Statistics of Japan*

3. Revisions of Quality Adjustment Methods	
Revision of the scope for application of the *hedonic regression method*	・Expanded the scope for application to each product of passenger cars, smartphones, and LCD Televisions ・Aborted the application to each commodity of "Servers," "Video cameras," and "Computer printers"
Introduction of new quality adjustment methods	・Introduced following four methods: (1) *Attribute cost adjustment method* (2) *Option cost method* (3) *Fuel efficiency method* (4) *Webscraped prices comparison method*

4. Changes in the Calculation of Weights
・Estimated weights of the PPI by combining the *Census of Manufacture 2014* and dynamic statistics such as the *Current Survey of Production 2015*

Number of Commodities and Coverage of the 2015 Base Corporate Goods Price Index

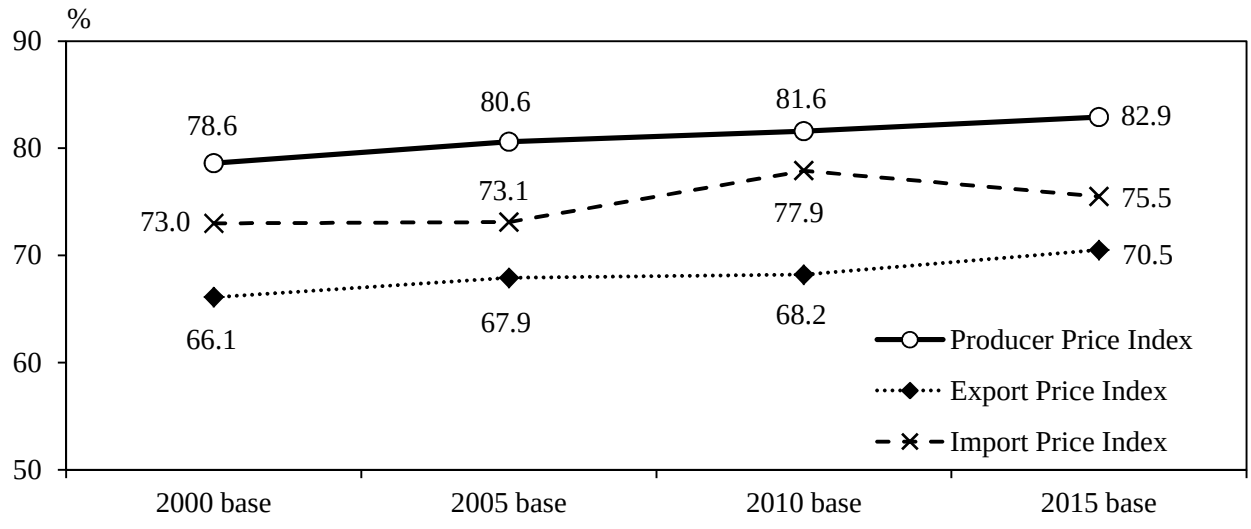
(1) Changes in the Number of Commodities

	Total	Producer Price Index	Export Price Index	Import Price Index
2015 base (A)	1,213	746	209	258
2010 base (B)	1,286	822	210	254
Changes in the number of commodities (A-B)	(73)	(76)	(1)	4
Newly added	31	7	10	14
Split	8	4	1	3
Deleted	(34)	(22)	(2)	(10)
Consolidated	(78)	(65)	(10)	(3)

(2) Total Transaction Value Used in the Calculation of Weights /Threshold for Including Individual Commodities

	Producer Price Index	Export Price Index	Import Price Index
Total transaction value (A)	237,674.0 bil. yen	74,442.4 bil. yen	78,747.2 bil. yen
Total Transaction Value used in the calculation of weights (B)	215,448.5 bil. yen	68,505.0 bil. yen	73,875.4 bil. yen
Total transaction value of all the commodities included (C)	178,618.9 bil. yen	48,285.3 bil. yen	55,795.9 bil. yen
Coverage (C/B)	82.9%	70.5%	75.5%
<Reference> 2010 base	81.6%	68.2%	77.9%
Threshold for including individual commodities (Relative to the total transaction value used in the calculation of weights)	21.5 bil. yen (1/10,000th)	34.3 bil. yen (5/10,000th)	36.9 bil. yen (5/10,000th)

(3) Changes in Coverage



Note: The figure for Total transaction value (A) of the PPI in (2) is that of CY2014.

Changes in the Labelling of Certain Groups

(1) Producer Price Index

2010 base	2015 base
Major group	Major group
Group	Group
Manufacturing industry products	Manufacturing industry products
Food, beverages, tobacco & feedstuffs	Beverages & foods
Textile products	Textile products
Lumber & wood products	Lumber & wood products
Pulp, paper & related products	Pulp, paper & related products
Chemicals & related products	Chemicals & related products
Petroleum & coal products	Petroleum & coal products
Plastic products	Plastic products
Ceramic, stone & clay products	Ceramic, stone & clay products
Iron & steel	Iron & steel
Nonferrous metals	Nonferrous metals
Metal products	Metal products
General purpose machinery	General purpose machinery
Production machinery	Production machinery
Business oriented machinery	Business oriented machinery
Electronic components & devices	Electronic components & devices
Electrical machinery & equipment	Electrical machinery & equipment
Information & communications equipment	Information & communications equipment
Transportation equipment	Transportation equipment
Other manufacturing industry products	Other manufacturing industry products
Agriculture, forestry & fishery products	Agriculture, forestry & fishery products
Agriculture, forestry & fishery products	Agriculture, forestry & fishery products
Minerals	Minerals
Minerals	Minerals
Electric power, gas & water	Electric power, gas & water
Electric power, gas & water	Electric power, gas & water
Scrap & waste	Scrap & waste
Scrap & waste	Scrap & waste

(2) Export Price Index

2010 base	2015 base
Group	Group
Textiles	Textiles
Chemicals & related products	Chemicals & related products
Metals & related products	Metals & related products
General purpose, production & business oriented machinery	General purpose, production & business oriented machinery
Electric & electronic products	Electric & electronic products
Transportation equipment	Transportation equipment
Other primary products & manufactured goods	Other primary products & manufactured goods

(3) Import Price Index

2010 base	2015 base
Group	Group
Foodstuffs & feedstuffs	Beverages & foods and agriculture products for food
Textiles	Textiles
Metals & related products	Metals & related products
Wood, lumber & related products	Lumber & wood products and forest products
Petroleum, coal & natural gas	Petroleum, coal & natural gas
Chemicals & related products	Chemicals & related products
General purpose, production & business oriented machinery	General purpose, production & business oriented machinery
Electric & electronic products	Electric & electronic products
Transportation equipment	Transportation equipment
Other primary products & manufactured goods	Other primary products & manufactured goods

Changes in Group Weights: Producer Price Index

(1) Producer Price Index

Major group / Group	Weights (rate per thousand) 2010 base	2015 base	Difference
Total (All commodities)	1,000.0	1,000.0	-
Manufacturing industry products	902.5	888.3	(14.2)
Beverages & foods	137.5	141.6	4.1
Textile products	10.9	9.6	(1.3)
Lumber & wood products	8.2	9.2	1.0
Pulp, paper & related products	29.1	27.7	(1.4)
Chemicals & related products	92.1	89.2	(2.9)
Petroleum & coal products	57.4	59.5	2.1
Plastic products	38.5	38.2	(0.3)
Ceramic, stone & clay products	23.7	23.3	(0.4)
Iron & steel	56.6	51.7	(4.9)
Nonferrous metals	27.1	27.1	0.0
Metal products	37.9	40.0	2.1
General purpose machinery	25.7	27.2	1.5
Production machinery	30.8	41.1	10.3
Business oriented machinery	19.2	16.2	(3.0)
Electronic components & devices	31.0	24.5	(6.5)
Electrical machinery & equipment	49.0	52.7	3.7
Information & communications equipment	40.4	20.8	(19.6)
Transportation equipment	136.4	140.7	4.3
Other manufacturing industry products	51.0	48.0	(3.0)
Agriculture, forestry & fishery products	33.9	35.8	1.9
Minerals	4.2	3.9	(0.3)
Electric power, gas & water	52.7	67.1	14.4
Scrap & waste	6.7	4.9	(1.8)

Note: The labelling of group is based on the classification of the 2015 base index.

Changes in Group Weights: Export/Import Price Index

(2) Export Price Index

Group	Weights (rate per thousand)		
	2010 base	2015 base	Difference
Total (All commodities)	1,000.0	1,000.0	-
Textiles	12.5	13.8	1.3
Chemicals & related products	95.4	98.4	3.0
Metals & related products	118.2	108.5	(9.7)
General purpose, production & business oriented machinery	192.0	189.4	(2.6)
Electric & electronic products	232.9	205.5	(27.4)
Transportation equipment	240.6	285.2	44.6
Except for Steel ships	240.6	262.6	22.0
Other primary products & manufactured goods	108.4	99.2	(9.2)

(3) Import Price Index

Group	Weights (rate per thousand)		
	2010 base	2015 base	Difference
Total (All commodities)	1,000.0	1,000.0	-
Beverages & foods and agriculture products for food	75.8	80.4	4.6
Textiles	53.5	61.3	7.8
Metals & related products	117.1	95.8	(21.3)
Lumber & wood products and forest products	16.5	17.3	0.8
Petroleum, coal & natural gas	305.4	252.3	(53.1)
Chemicals & related products	83.3	94.7	11.4
General purpose, production & business oriented machinery	53.9	68.1	14.2
Electric & electronic products	184.3	196.6	12.3
Transportation equipment	34.1	49.5	15.4
Other primary products & manufactured goods	76.1	84.0	7.9

Transaction Values of Newly Added or Deleted Commodities

(1) Producer Price Index

bil. yen

Newly added commodities	2015 base transaction values
Motor vehicles for special-use	231.6
Magnetic parts	82.8
Construction tractors & parts	68.1
Butadiene	65.9
Non-alcoholic beverages	65.6
Cereals	61.5
Fuel cells	33.3
⋮	⋮
Total	608.7

bil. yen

Deleted commodities	2010 base transaction values	2015 base transaction values
Frozen prepared confectioneries	30.7	42.8
Rails	19.1	35.6
Fasteners, snaps & sewing needles	34.4	29.8
Zinc die-castings	28.5	27.3
Microwave ovens	59.5	24.8
Special printing paper	20.8	20.4
Acetic acid	20.0	19.6
⋮	⋮	⋮
Total	511.0	367.1

(2) Export Price Index

bil. yen

Newly added commodities	2015 base transaction values
Steel ships	1,327.8
Gasoline	184.9
Disposable diapers	180.4
Semi-finished common steel products	180.1
Piezoelectric ceramic devices & filters	149.7
Steam & gas turbines	74.3
Rails	59.3
⋮	⋮
Total	2,321.0

bil. yen

Deleted commodities	2010 base transaction values	2015 base transaction values
Terephthalic acid	27.3	10.6
Acrylonitrile	37.7	10.1
Total	65.0	20.6

(3) Import Price Index

bil. yen

Newly added commodities	2015 base transaction values
Frozen precooked foods	261.3
Radar apparatus & radio remote control apparatus and radio navigational aid apparatus for cars	181.4
Agents affecting digestive organs	142.9
Electromedical equipment	129.7
Gasoline	125.1
Lifesaving & protective goods	94.6
Metal cutting machine tools	91.6
⋮	⋮
Total	1,414.2

bil. yen

Deleted commodities	2010 base transaction values	2015 base transaction values
Manganese ores	33.1	24.7
Photosensitive materials	30.0	21.7
Ferro-nickel	20.5	20.3
Sorghum	26.5	18.3
Unwrought rhodium	65.4	16.1
Crystal oscillators	35.3	15.3
Unwrought indium	19.5	11.3
⋮	⋮	⋮
Total	245.9	139.9

Note: Figures for 2015 base transaction values of deleted commodities are those of CY2014.

Overview of Amending Commodities: Producer Price Index

Newly added commodities

2010 base		2015 base	
Beverages & foods	Not adopted	Cereals	0.3
		Non-alcoholic beverages	0.3
Chemicals & related products		Butadiene	0.4
Production machinery	⇒	Construction tractors & parts	0.7
Electronic components & devices		Magnetic parts	0.5
Electrical machinery & equipment		Fuel cells	0.2
Transportation equipment		Motor vehicles for special-use	1.1

Split commodities

Beverages & foods	Raw noodles	2.1	⇒	Japanese noodles	1.5
	Dried noodles	0.4		Chinese noodles	0.9
Plastic products	Plastic containers for items other than drinks	5.1	⇒	Plastic hollow containers	2.2
				Plastic containers (except plastic hollow containers)	2.7
Electrical machinery & equipment	Lithium ion batteries	0.9	⇒	Lithium ion batteries for motor vehicles	0.6
				Lithium ion batteries (except for motor vehicles)	0.4
Transportation equipment	Mini passenger cars	5.7		Mini passenger cars	7.7
	Small passenger cars (except hybrid cars)	7.2		Small passenger cars (gasoline cars)	5.7
				Small passenger cars (hybrid cars)	5.2
	Standard passenger cars (except hybrid cars)	13.8	⇒	Standard passenger cars (gasoline cars)	6.7
				Standard passenger cars (hybrid cars)	4.7
	Hybrid cars	6.2		Passenger vehicles (clean energy vehicles)	2.6

Expanded commodities

Textile products	Synthetic filament yarn	1.6	⇒	Yarn of chemical fibers	1.3
Chemicals & related products	Super absorbent polymer	0.4	⇒	Super absorbent polymer & ion exchange resins	0.5
	Agents for ophthalmic use (ethical)	0.7	⇒	Agents affecting sensory organs	0.9
	Antidiavetic agents	0.8	⇒	Other agents affecting metabolism	3.2
	Vaccines, human blood preparations, etc.	1.3	⇒	Biological preparations	1.4
Ceramic, stone & clay products	Glass substrates & cover glass	1.8	⇒	Glass substrates & applied products	0.9
Nonferrous metals	Bronze castings	0.5	⇒	Copper-base alloy castings	0.5
Metal products	Oil stoves & heated air systems	0.8	⇒	Oil equipment for heating	0.9
Production machinery	Industrial robots	2.0	⇒	Robots	2.5
Business oriented machinery	Materials testers	0.3	⇒	Instruments & appliances for testing	0.4
Transportation equipment	Aircraft engine parts	1.3	⇒	Aircraft parts	3.3
	Forklift trucks	1.4	⇒	Forklift trucks & parts	2.0

Consolidated commodities

Beverages & foods	Glucose	0.1	⇒	Glucose & starch syrup	0.4
	Corn syrup	0.2			
	Soybean oil	0.2		Vegetable oils and fats (except blended vegetable oils and fats)	1.3
	Corn oil	0.1	⇒		
	Rape oil	1.1			
	Umami seasonings	0.3	⇒	*Umami* & flavor seasonings	1.0
	Flavor seasonings	0.6			
	Instant *miso* soup	0.2	⇒	Instant *miso* soup & soup	0.6
	Instant soup	0.3			
	Beer containing less than 66.7% by weight of malt	1.6	⇒	Sparkling alcoholic beverages (except beer)	4.0
	Other sparkling alcoholic beverages	3.2			
Textile products	Cotton yarn	0.1	⇒	Yarn of natural fibers	0.3
	Woolen & worsted yarn	0.1			
	Silk fabrics	0.1		Natural fiber fabrics	0.4
	Cotton fabrics	0.1	⇒		
	Woolen & worsted fabrics	0.1			
	Synthetic filament fabrics	0.4	⇒	Chemical fiber fabrics	0.2
	Spun synthetic yarn fabrics	0.1			
	Women's or girls' underwear	0.3	⇒	Women's or girls' underwear & foundation garments	0.3
	Foundation garments	0.2			

Note: Figures in the tables indicate the weights in indexes of each base (rate per thousand). Left column indicates labelling of groups based on the classification of the 2015 base index. For deleted commodities, those of the 2010 base index.

Overview of Amending Commodities: Producer Price Index (Cont'd)

Consolidated commodities (cont'd)	2010 base			2015 base	
Pulp, paper & related products	Printing paper (medium grades)	0.2	⇒	Printing paper (medium & low grades)	0.3
	Printing paper (low grades)	0.2			
	Carbonless paper	0.7	⇒	Carbonless & adhesive papers	0.4
	Adhesive papers	0.1			
Chemicals & related products	Low density polyethylene resins	1.5	⇒	Polyethylene resins	2.2
	High density polyethylene resins	0.6			
	Ethical pharmaceutical products 7 items	9.3	⇒	Ethical pharmaceutical products 2 items	8.5
	Retail pharmaceutical products 9 items	2.7	⇒	Retail pharmaceutical products 3 items	3.7
	Quasi-drugs 2 items	0.8	⇒	Quasi-drugs	0.7
	Nitrogenous fertilizers	0.1	⇒	Straight & compound fertilizers	1.4
	Mixed fertilizers	1.3			
	Soap	0.2	⇒	Bath & laundry soap	0.5
	Liquid hand soap & body soap	0.3			
	Photographic film	0.3			
	Sensitive materials for photoengraving	0.3	⇒	Photosensitive materials	0.4
	Chemicals for photography	0.6			
Plastic products	Hard plastic tubes	1.0	⇒	Plastic pipes and tubes	1.5
	Plastic hoses	0.2			
	Plastic films & sheets	5.8	⇒	Plastic films & sheets	8.8
	Plastic polarizing films	1.2			
Iron & steel	Pig iron castings for machinery	3.6	⇒	Iron castings for machinery	3.8
	Malleable iron castings for machinery	0.2			
Nonferrous metals	Copper strips	0.8	⇒	Rolled and drawn copper products	1.0
	Copper pipes & tubes	0.4			
	Brass strips	0.4	⇒	Rolled and drawn brass products	0.9
	Brass bars & rods	0.5			
	Aluminum sheets & strips	0.5	⇒	Rolled aluminum & aluminum alloy products	2.0
	Aluminum alloy sheets & strips	1.7			
	Aluminum alloy rods & bars/wires	0.1			
	Aluminum alloy pipes	0.2	⇒	Extruded aluminum alloy products	1.4
	Aluminum alloy shapes & profiles	1.1			
	Power cables	1.2	⇒	Power & telecommunications cables except optical fiber cables	2.0
	Telephone & telecommunications cables except optical fiber cables	0.7			
Metal products	Gas cooking appliances	1.0	⇒	Gas equipment for cooking, boiling & heating	3.1
	Gas water boilers & hot water heating systems	2.0			
General purpose machinery	Internal combustion gasoline engines for industry	0.3	⇒	General-purpose internal combustion engines	1.5
	Internal combustion diesel engines for industry	1.0			
	Compressors	0.3		Compressors, fans & blowers	0.6
	Fans & blowers	0.1	⇒		
	Refrigerating machines	0.3		Refrigerating machines	2.3
Production machinery	Printing & plate making machinery	0.4	⇒	Printing, plate making & bookbinding machinery	0.9
	Bookbinding machinery	0.1			
	Filters	1.2			
	Separators	0.8	⇒	Chemical machinery	2.8
	Heat exchangers	0.4			
	Dust collectors	0.5			
	Pneumatic tools	0.1	⇒	Pneumatic & electric tools	1.2
	Electric tools	0.7			
Business oriented machinery	Pressure instruments	0.1	⇒	Pressure instruments & flow meters	0.2
	Flow meters	0.4			
	Instruments for measuring length	0.2	⇒	Precision measuring instruments	0.4
	Precision measuring instruments	0.4			
	Optical & spectrophotometric analyzers	0.1			
	Electromagnetic analyzers	0.2	⇒	Analytical instruments	0.3
	Chromatographs, separators & distillatory apparatus	0.2			
Electronic components & devices	Light emitting diodes	0.3	⇒	Photoelectric converter devices	0.8
	Opto electronic devices (except light emitting diodes)	1.0			

Overview of Amending Commodities: Producer Price Index (Cont'd)

Consolidated commodities (cont'd)

2010 base				2015 base	
Electronic components & devices (cont'd)	Diodes	0.4	⇒	Diodes & rectifying devices	0.4
	Rectifiers	0.3			
	Electroacoustic transducers	0.2	⇒	Transducers	0.4
	Ultracompact motors	0.3			
	Connectors for electronic equipment	1.9	⇒	Connecting components	2.0
	Switches for electronic equipment	0.1			
	Semiconductor memory media	0.2	⇒	Storage media	0.5
	Recording media	0.4			
Electrical machinery & equipment	Electric bulbs for motor vehicles	0.5	⇒	Electric bulbs & discharge lamps (for motor vehicles)	0.2
	High intensity discharge lamps	0.2		Electric bulbs & discharge lamps (except for motor vehicles)	0.6
	Fluorescent lamps	0.6			
	Electric lamps & lighting fittings using incandescent lamps	1.5	⇒	Electric luminaries (for motor vehicles)	1.8
	Electric lamps & lighting fittings using fluorescent lamps	1.3		Electric luminaries (except for motor vehicles)	2.2
Information & communications equipment	Switching equipment	0.4			
	Key telephones & intercoms	0.2	⇒	Wired telecommunications equipment	1.9
	Carrier transmission equipment	1.9			
	Video recording and/or reproducing apparatus	0.6			
	Video cameras	0.8	⇒	Visual equipment	0.1
	Digital cameras	2.1			
	Car audio equipment	2.0	⇒	Electric audio equipment	2.2
	Home audio equipment	0.1			
	Computer storage devices using magnetic disks	1.1	⇒	External storages	1.3
	Optical disk storages	0.4			
Other manufacturing industry products	Jewelry (except pearl accessories)	0.1	⇒	Jewelry	0.3
	Pearl accessories	0.1			
Scrap & waste	Copper scrap	0.2	⇒	Copper & copper alloy scrap	0.3
	Copper alloy scrap	0.2			

Reduced commodities

Pulp, paper & related products	Wallpaper & paper for fusuma, sliding doors	0.2	⇒	Wallpapers	0.3
Nonferrous metals	Aluminum & aluminum alloy castings	0.8	⇒	Aluminum alloy castings	0.9
	Aluminum die-castings	2.4	⇒	Aluminum alloy die castings	2.7
Business oriented machinery	Lenses & exchange lenses for photographic cameras	0.7	⇒	Exchange lenses for cameras	0.1

Deleted commodities

Beverages & foods	Jams	0.1	⇒	Deleted
	Frozen prepared confectioneries	0.1		
Pulp, paper & related products	Special printing paper	0.1		
Chemicals & related products	Acetic acid	0.1		
	Ethyl acetate	0.1		
	Petroleum resins	0.1		
	Formalin	0.1		
	Rubber organic chemicals	0.1		
	Agents for public health	0.1		
Iron & steel	Rails	0.1		
	Spring steel	0.1		
	Stainless steel wires	0.1		
Nonferrous metals	Aluminum foil	0.1		
	Zinc die-castings	0.2		
Production machinery	Power sprayers	0.1		
	Gas welding & cutting equipment	0.3		
Business oriented machinery	Microscopes	0.3		
	Optical lenses	0.5		
Electrical machinery & equipment	Electric welders	0.1		
	Microwave ovens	0.4		
Other manufacturing industry products	Fasteners, snaps & sewing needles	0.1		
Agriculture, forestry & fishery products	Barley	0.1		

Overview of Amending Commodities: Export Price Index

Newly added commodities

2010 base		2015 base	
Chemicals & related products	Not adopted	⇒	Benzene 0.9
			Toluene 1.1
			Xylene 3.1
Metals & related products			Semi-finished common steel products 2.7
			Rails 0.9
General purpose, production & business oriented machinery			Steam & gas turbines 4.4
Electric & electronic products			Piezoelectric ceramic devices & filters 2.7
Transportation equipment			Steel ships 22.6
Other primary products & manufactured goods			Disposable diapers 3.3
			Gasoline 2.8

Split commodities

Transportation equipment	Small passenger cars	15.0	⇒	Small passenger cars (gasoline cars) 3.6
	Standard passenger cars	110.6		Standard passenger cars (gasoline cars) 110.6
				Passenger vehicles (hybrid & clean energy vehicles) 28.8

Expanded commodities

Textiles	Cotton fabrics	2.1	⇒	Natural fiber fabrics 2.8
	Synthetic filament & spun synthetic yarn fabrics	5.3	⇒	Chemical fiber fabrics 5.0
Chemicals & related products	Super absorbent polymer	2.4	⇒	Super absorbent polymer & ion exchange resins 2.9
Metals & related products	Aluminum alloy sheets & strips	2.1	⇒	Rolled aluminum & aluminum alloy products 2.3
General purpose, production & business oriented machinery	Construction tractors	2.5	⇒	Construction tractors & parts 2.1
Electric & electronic products	Assemblies	0.4	⇒	Unit parts 0.4
	Video cameras & digital cameras	17.3	⇒	Visual equipment 8.6
Other primary products & manufactured goods	Glass substrates & cover glass	11.5	⇒	Glass substrates & applied products 5.6

Consolidated commodities

Metals & related products	Copper strips	3.9	⇒	Rolled and drawn copper products 4.7
	Copper pipes & tubes	2.2		
General purpose, production & business oriented machinery	Internal combustion gasoline engines for industry	2.3	⇒	General-purpose internal combustion engines 6.3
	Internal combustion diesel engines for industry	10.7		
	Oil hydraulic pumps	2.2	⇒	Oil hydraulic & pneumatic machinery 7.1
	Oil hydraulic & pneumatic valves	3.8		
	Speed changers	2.7	⇒	Power transmission equipment 7.8
	Gears	2.2		
	Roller chains	0.7		
	Plain shaft bearings	1.4		
	Knitting machines	2.5	⇒	Textile machinery 5.1
	Industrial sewing machines	3.7		
Electric & electronic products	Diodes	0.6	⇒	Diodes & rectifying devices 1.3
	Rectifiers	1.2		
	Semiconductor memory media	1.5	⇒	Storage media 1.5
	Recording media	4.7		
Transportation equipment	Forklift trucks	1.9	⇒	Forklift trucks & parts 2.1
	Forklift truck parts	0.4		

Reduced commodities

General purpose, production & business oriented machinery	Refrigerating machines	0.9	⇒	Compressors for general refrigeration & air conditioning 0.6
	Microscopes & binoculars	0.8	⇒	Microscopes 1.0
	Lenses & exchange lenses for photographic cameras	3.9	⇒	Exchange lenses for cameras 3.7

Deleted commodities

Chemicals & related products	Acrylonitrile	2.4	⇒	Deleted
	Terephthalic acid	0.9		

Overview of Amending Commodities: Import Price Index

Newly added commodities

2010 base		2015 base	
Beverages & foods and agriculture products for food	Not adopted ⇒	Meat products	1.8
		Frozen precooked foods	4.8
Petroleum, coal & natural gas		Gasoline	1.8
Chemicals & related products		Bio-ETBE	2.9
		Agents affecting digestive organs	3.1
General purpose, production & business oriented machinery		General-purpose internal combustion engines	1.9
		Compressors (except for general refrigeration & air conditioning)	3.2
		Agricultural machinery	1.1
		Plasticworking machinery	1.4
		Metal cutting machine tools	2.1
Electric & electronic products		LED lamps	1.2
		Electromedical equipment	3.0
		Radar apparatus & radio remote control apparatus and radio navigational…	2.7
Other primary products & manufactured goods		Lifesaving & protective goods	1.4

Split commodities

Electric & electronic products	Discrete semiconductors	4.3	⇒	Photoelectric converter devices	1.7
				Semiconductor devices	1.5
	Electric luminaries	2.2	⇒	Electric luminaries (for motor vehicles)	1.4
				Electric luminaries (except for motor vehicles)	2.0
Transportation equipment	Small passenger cars	1.2		Small passenger cars (gasoline cars)	1.0
	Standard passenger cars	9.3	⇒	Standard passenger cars (gasoline cars)	12.0
				Passenger vehicles (hybrid & clean energy vehicles)	2.6

Expanded commodities

Beverages & foods and agriculture products for food	Whisky & brandy	0.6	⇒	Distilled, rectified & blended liquors	1.3
Textiles	Cotton yarn	0.8	⇒	Yarn of natural fibers	0.9
	Synthetic filament yarn	1.2	⇒	Yarn of chemical fibers	1.3
	Cotton fabrics	1.0	⇒	Natural fiber fabrics	1.0
	Synthetic filament & spun synthetic yarn fabrics	0.6	⇒	Chemical fiber fabrics	0.9
	Socks	1.7	⇒	Hosiery	2.0
Electric & electronic products	Recording media	2.8	⇒	Storage media	2.6
	Assemblies	1.0	⇒	Unit parts	0.7
Other primary products & manufactured goods	Industrial salt	2.6	⇒	Crude salt	2.5

Consolidated commodities

Textiles	Women's or girls' underwear	1.0	⇒	Women's or girls' underwear & foundation garments	2.3
	Foundation garments	1.0			
	Ties	0.3	⇒	Neckwear	0.9
	Scarves	0.5			
Electric & electronic products	Computer storage devices using magnetic disks	5.1	⇒	External storages	4.6
	Optical disk storages	0.6			

Reduced commodities

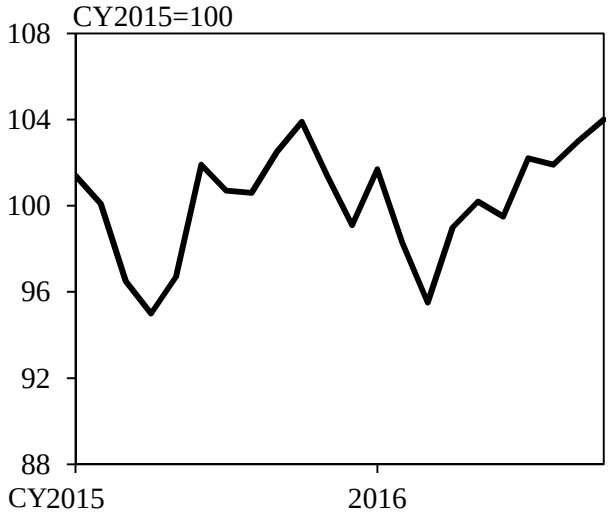
General purpose, production & business oriented machinery	Refrigerating machines	5.3	⇒	Compresspers for general refrigeration & air conditioning	1.3
Other primary products & manufactured goods	Flat glass	3.6	⇒	Glass substrates & applied products	2.7

Deleted commodities

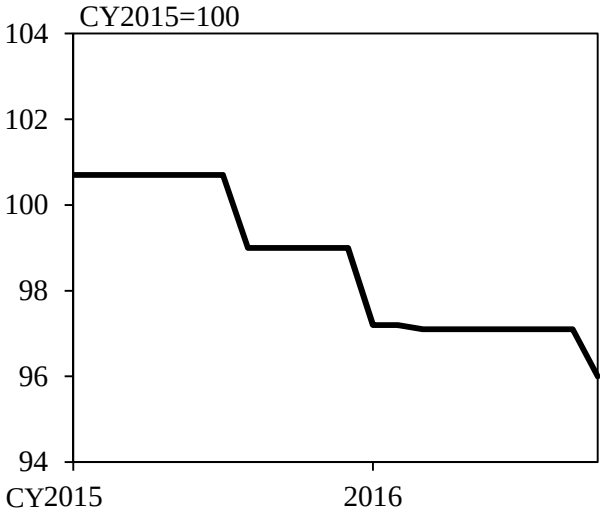
Beverages & foods and agriculture products for food	Sorghum	0.5	⇒	Deleted
Metals & related products	Manganese ores	0.6		
	Ferro-nickel	0.5		
	Unwrought rhodium	1.3		
	Unwrought indium	0.4		
Chemicals & related products	Ethylene & propylene	0.3		
	Acrylonitrile	0.1		
	Photosensitive materials	0.6		
Electric & electronic products	Crystal oscillators	1.1		
Other primary products & manufactured goods	Industrial diamonds	0.3		

Trends of Indexes for Newly Added Commodities: Producer Price Index

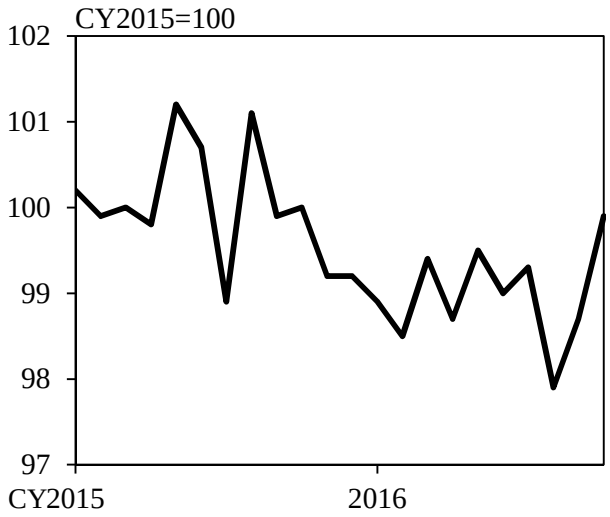
(1) "Motor vehicles for special-use"



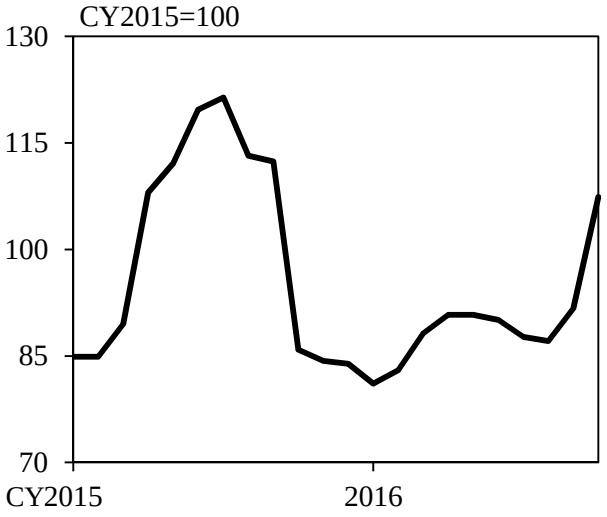
(2) "Magnetic parts"



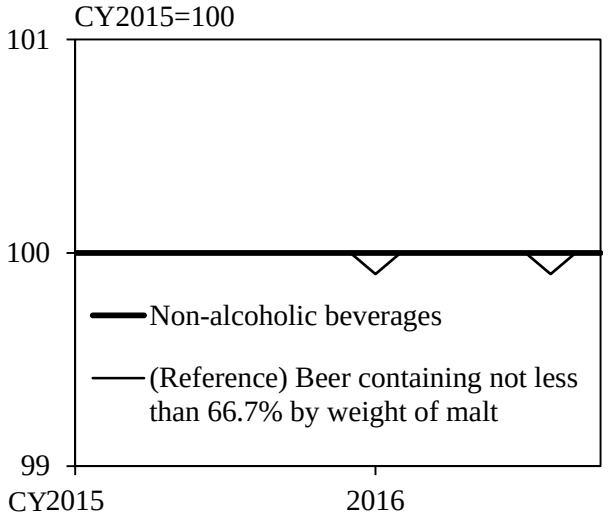
(3) "Construction tractors & parts"



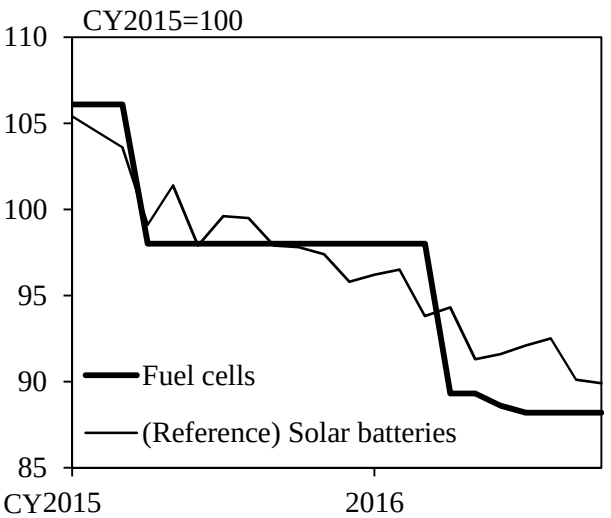
(4) "Butadiene"



(5) "Non-alcoholic beverages"

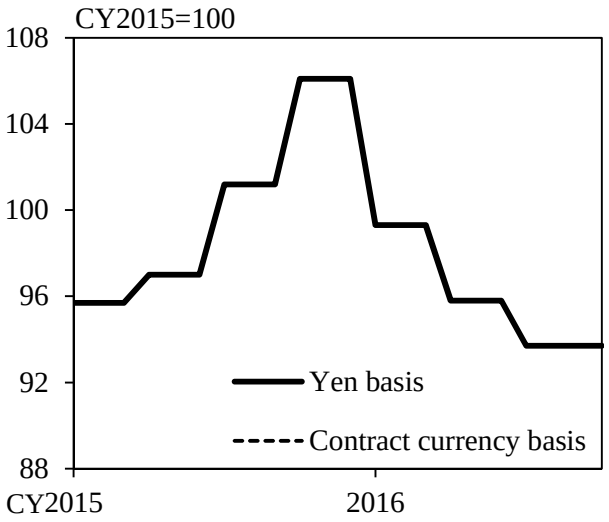


(6) "Fuel cells"

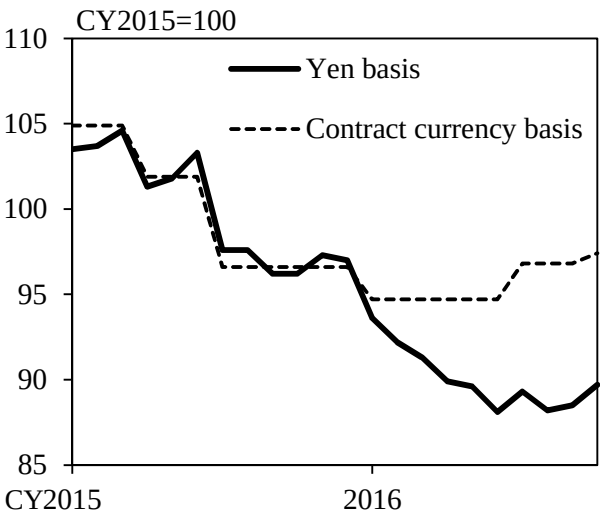


Trends of Indexes for Newly Added Commodities: Export Price Index

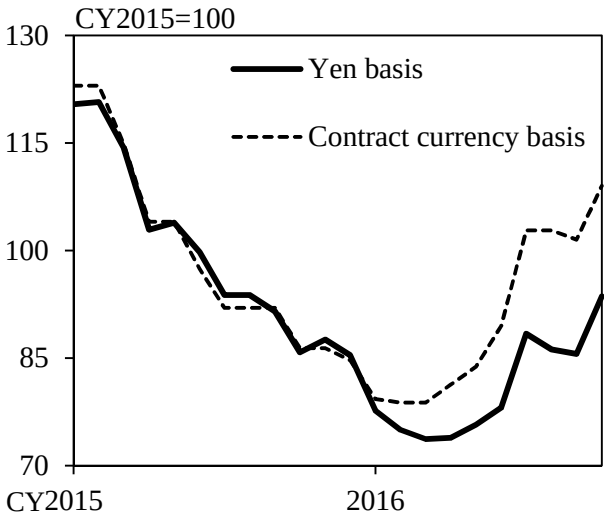
(7) "Steel ships"



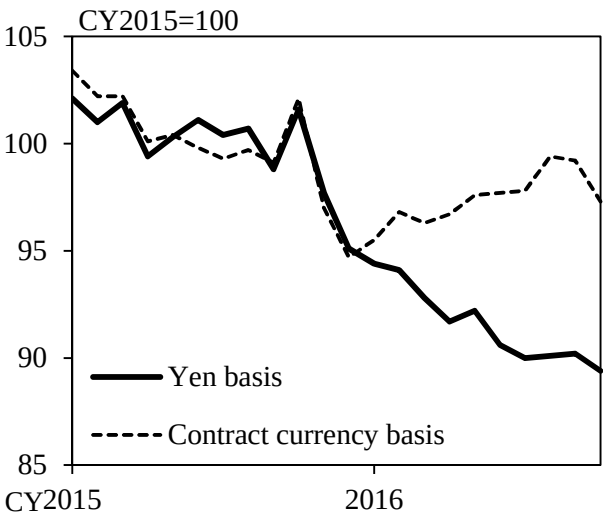
(8) "Disposable diapers"



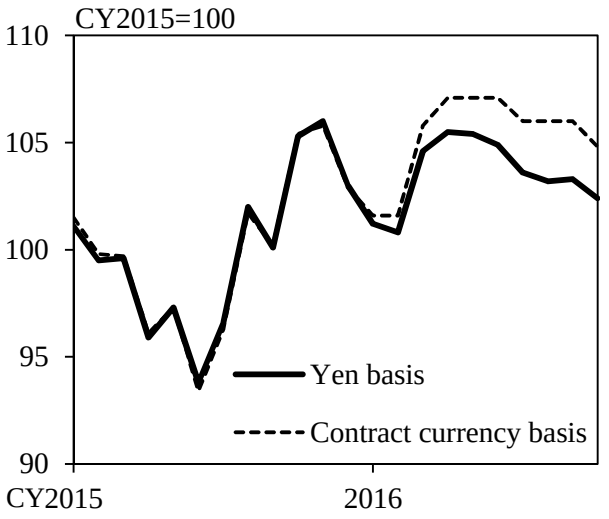
(9) "Semi-finished common steel products"



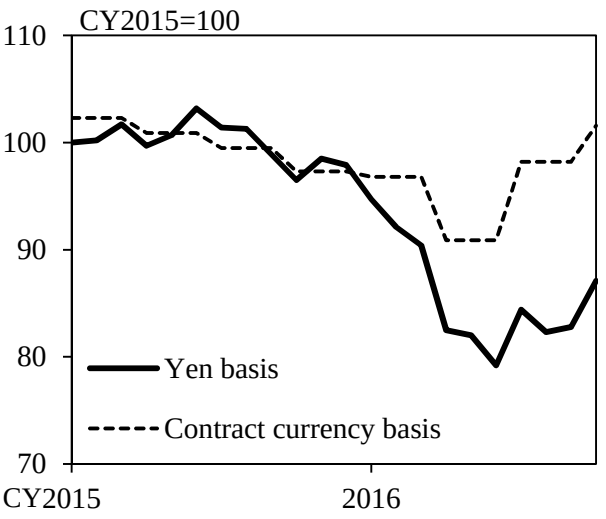
(10) "Piezoelectric ceramic devices & filters"



(11) "Steam & gas turbines"

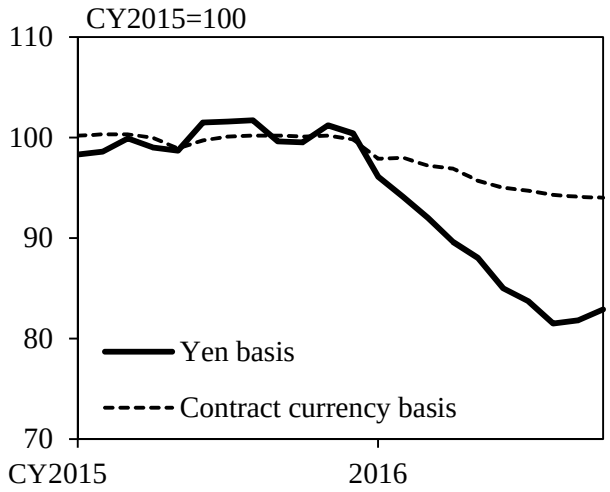


(12) "Rails"

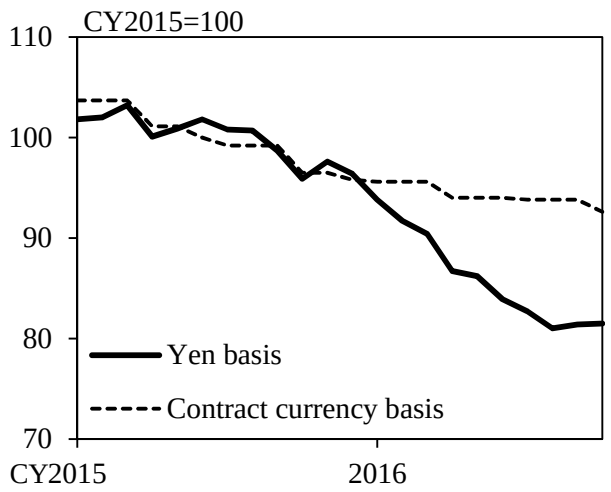


Trends of Indexes for Newly Added Commodities: Import Price Index

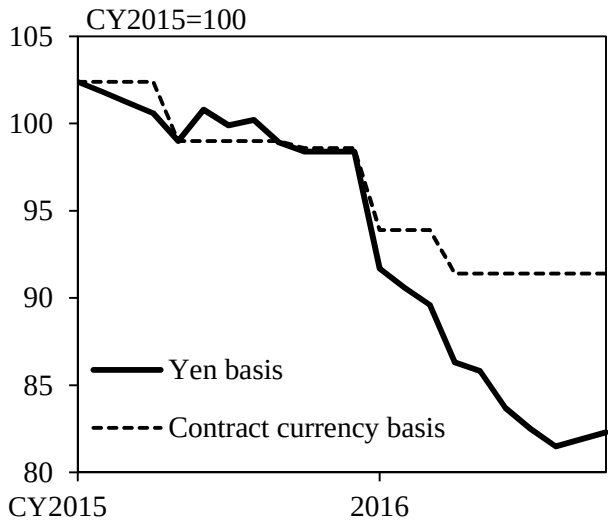
(13) "Frozen precooked foods"



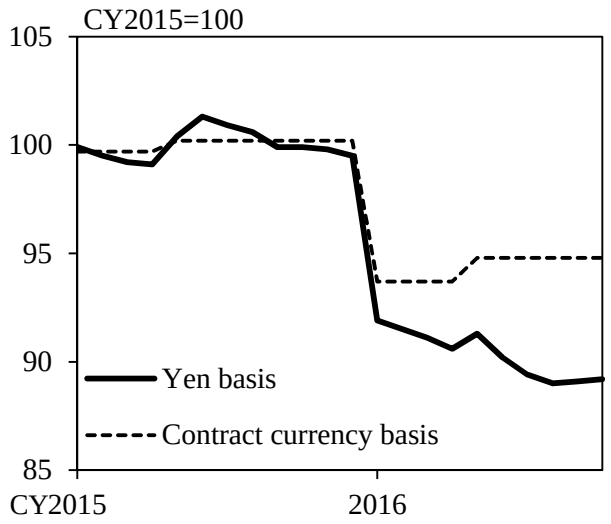
(14) "Radar apparatus & radio remote control apparatus and radio navigational aid apparatus for cars"



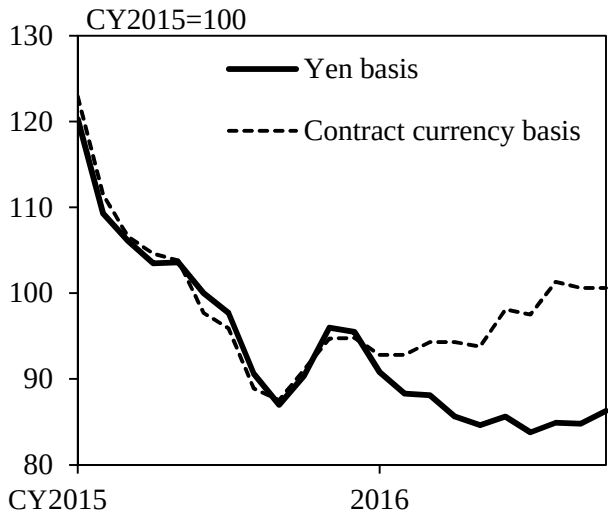
(15) "Agents affecting digestive organs"



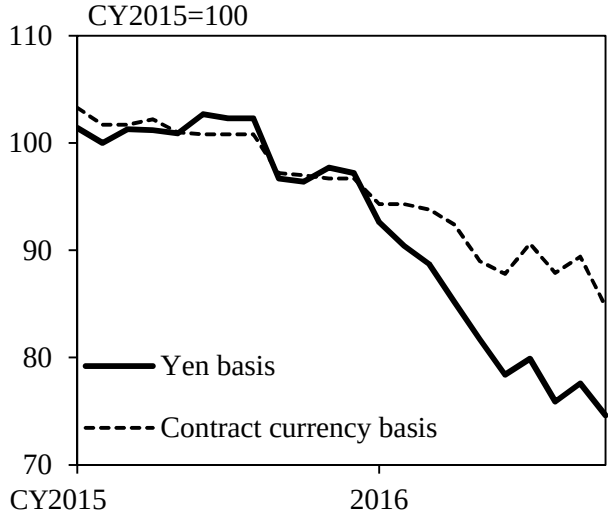
(16) "Electromedical equipment"



(17) "Bio-ETBE"



(18) "LED lamps"



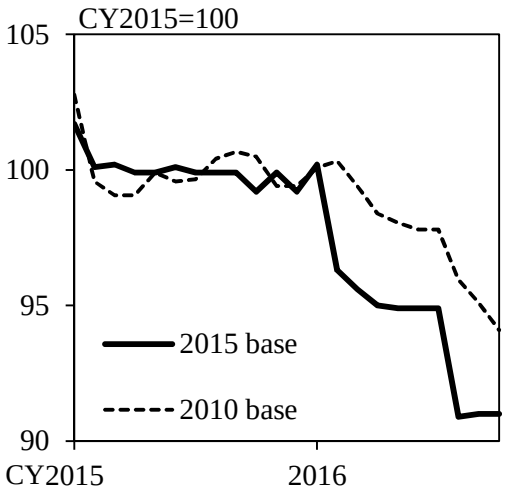
Trends of Indexes for Expanded Commodities

(1) Producer Price Index "Aircraft parts"

Scope of survey	Product
Parts, attachments and accessories of aircraft engines	Lubricating devices, Cooling system, Modules (for engines),etc.
Miscellaneous aircraft parts and auxiliary equipment, Aircraft engines	Main wing, Rotary wing, Aircraft propeller, Aircraft fuselage, Landing gear,etc.

2010 base

2015 base

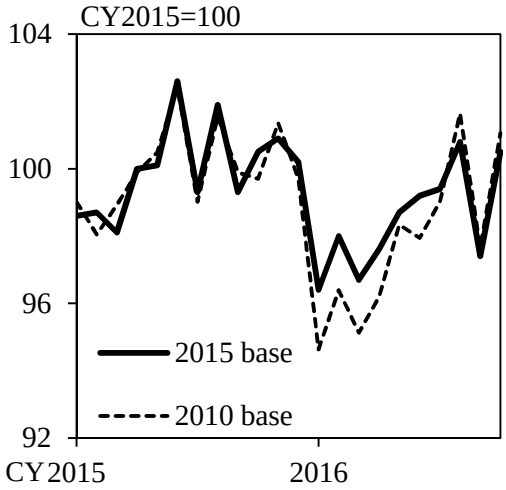


(2) Producer Price Index "Robots"

Scope of survey	Product
Numerical control robots, Miscellaneous robots, Robots, and parts, attachments and accessories	Variable sequence robots, Service robots, Modular Mounters (for industrial robots),etc.
(Miscellaneous robots)	The bank has started price surveys for Service robots

2010 base

2015 base

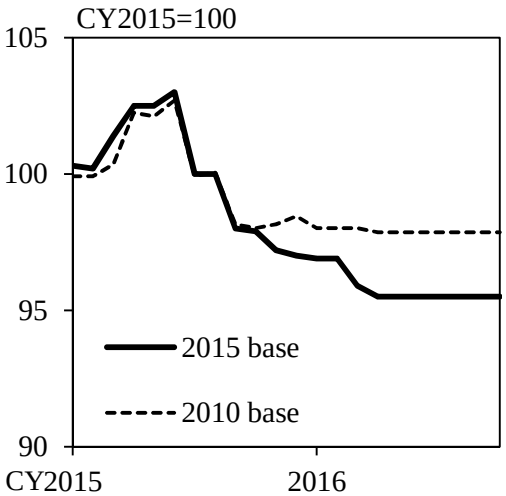


(3) Export Price Index "Glass substrates & applied products"

Scope of survey	Product
Miscellaneous plate glass in integral production, Miscellaneous flat glass	Glass substrates in integral production (for display), Cover glass (for touch panel),etc.
Miscellaneous glass and its products	Color filters, etc.

2010 base

2015 base

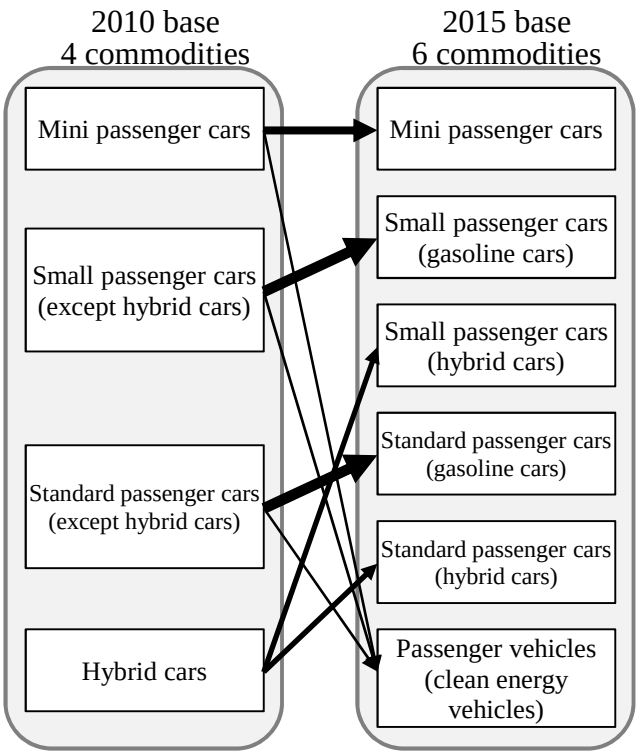


Note: The data in (3) are on the contract currency basis.
Source: Ministry of Economy, Trade and Industry "Census of Manufacture."

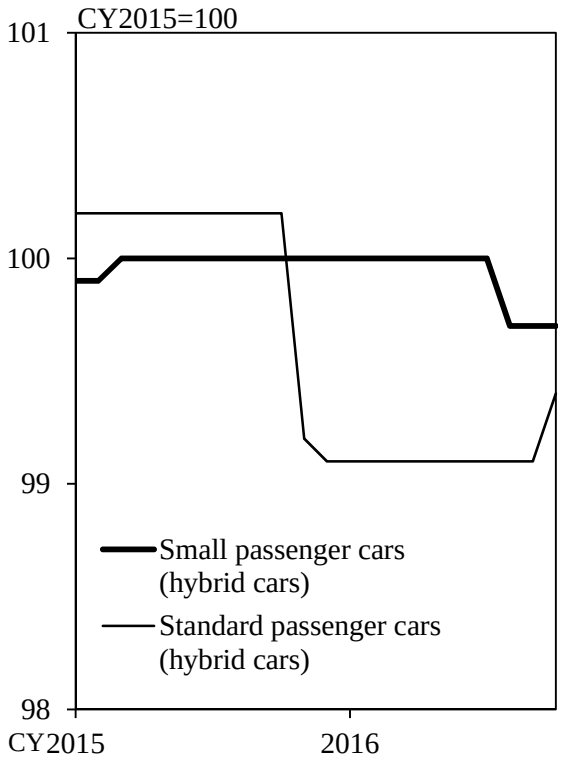
Trends of Indexes for Split Commodities

(1) Producer Price Index - Commodity class "Passenger cars"

Details of Split Commodities

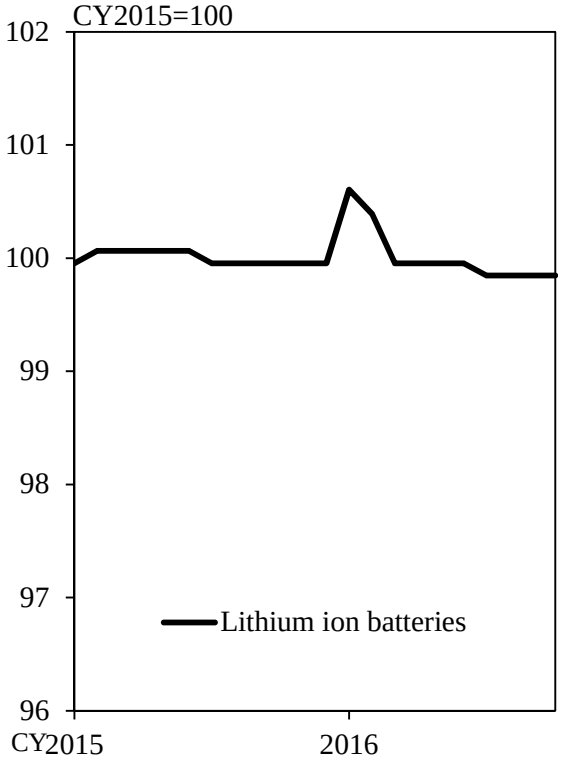


Developments in the 2015 base index

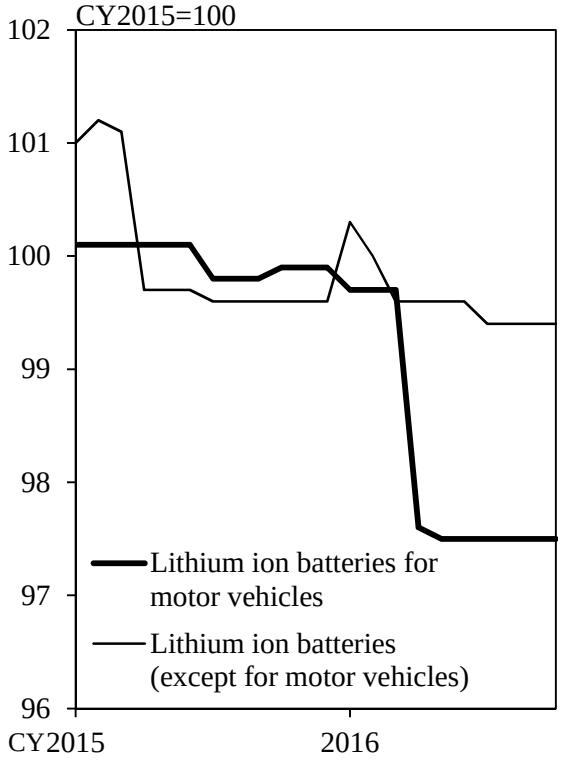


(2) Producer Price Index "Lithium ion batteries"

2010 base

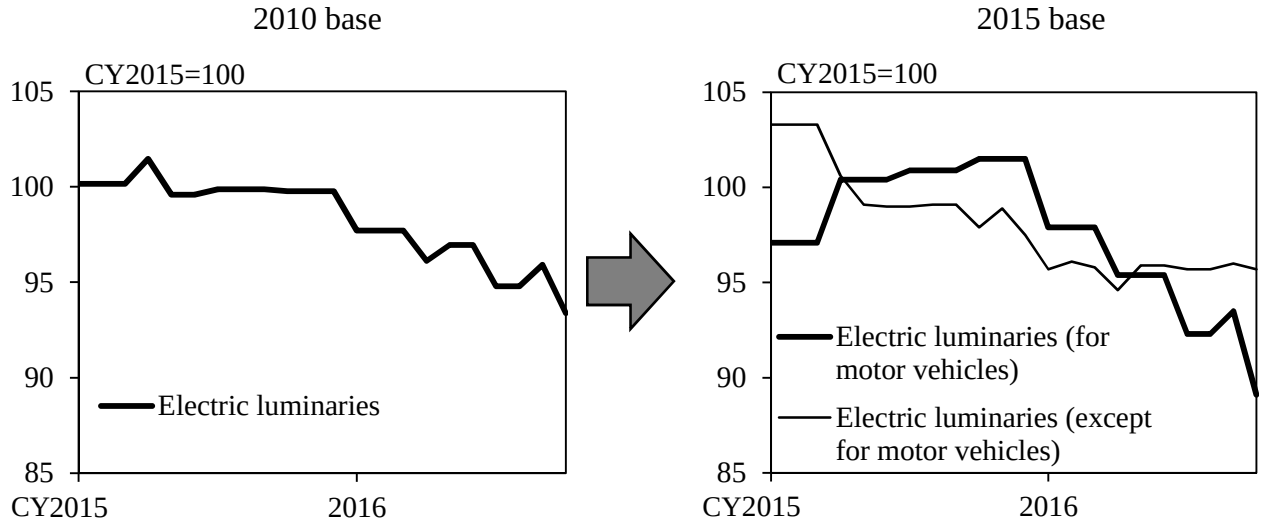


2015 base

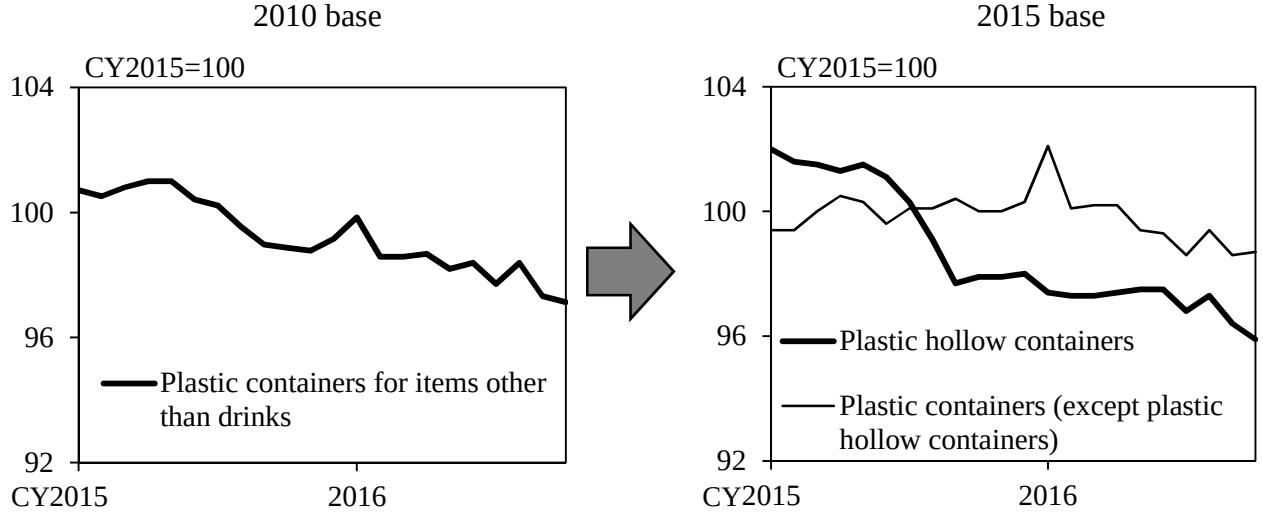


Trends of Indexes for Split Commodities (Cont'd)

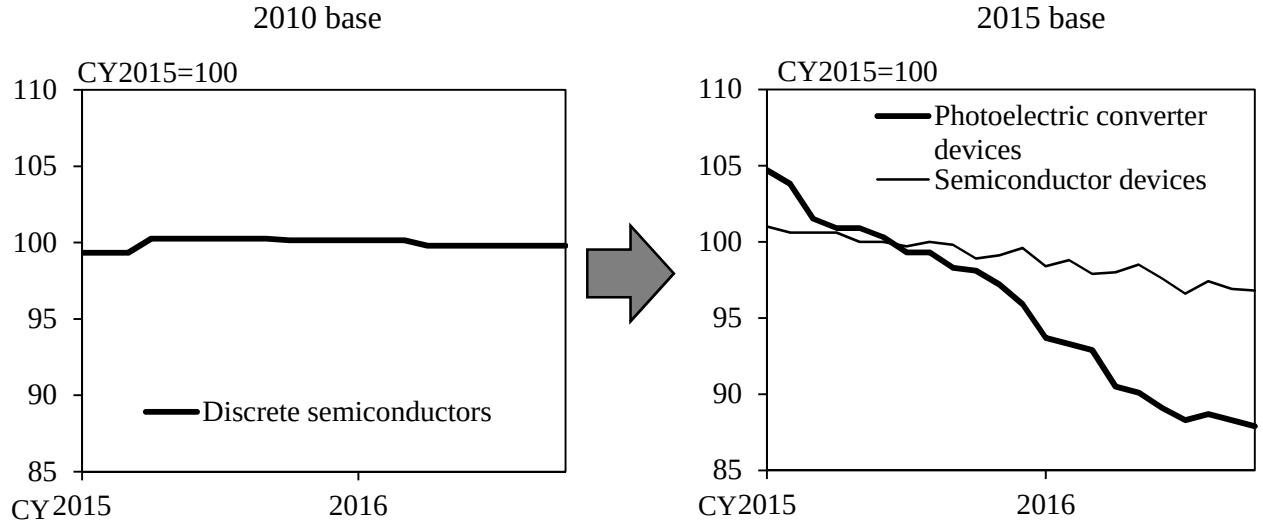
(3) Import Price Index "Electric luminaries"



(4) Producer Price Index "Plastic containers"



(5) Import Price Index "Semiconductor devices"



Note: The data in (3) and (5) are on the contract currency basis.

Overview of the Revisions of Quality Adjustment Methods

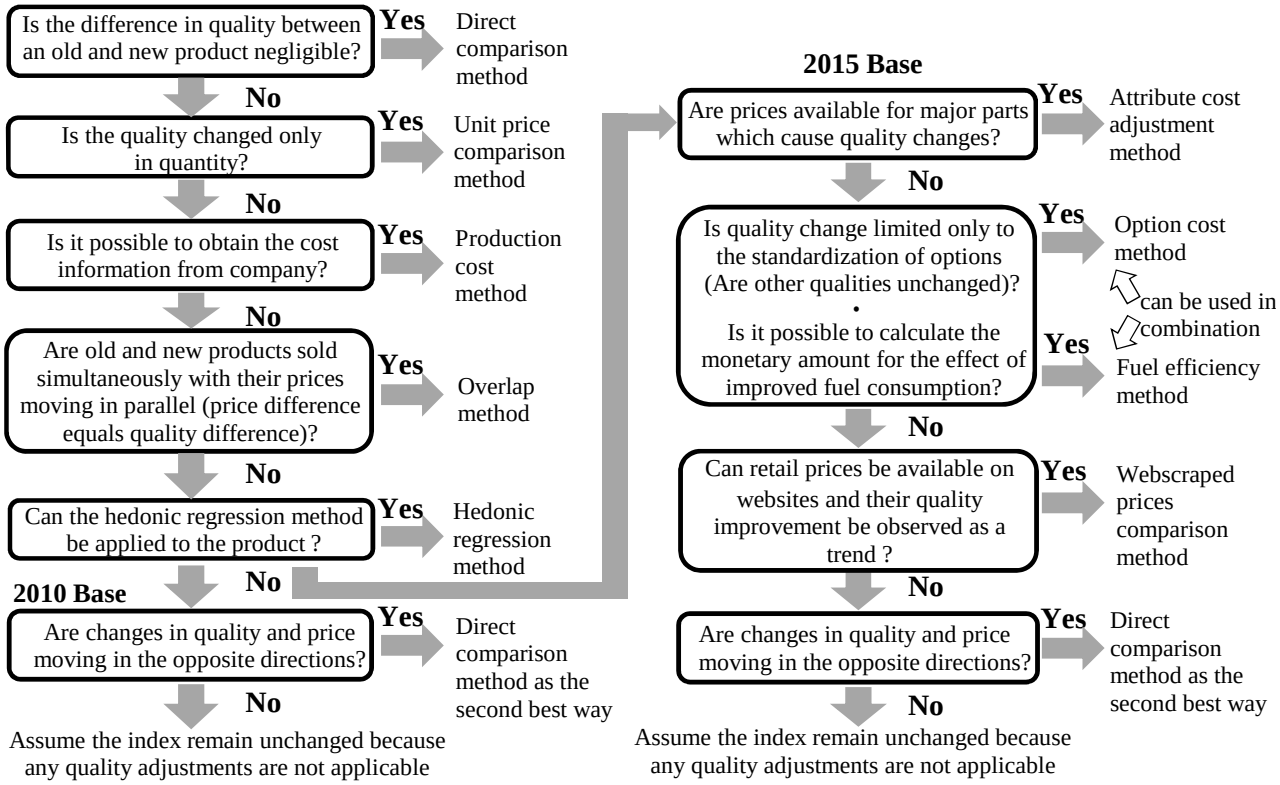
(1) Revisions of Applicable Scope of the Hedonic Regression Method

Start to apply	Continue to apply	Cease to apply
Passenger cars Sedan & Station Wagons / Minivans SUVs / Hatchbacks / Hybrid cars	Personal computers Desktop Notebook Tablet	Servers ⇒switch to the *attribute cost adjustment method*
Smartphones	Digital Cameras Compact digital cameras Mirrorless interchangeable-lens cameras Digital single-lens cameras	Video Cameras ⇒switch to the *production cost method* and the *webscraped prices comparison method*
LCD Televisions		Computer printers ⇒switch to the *production cost method* and the *webscraped prices comparison method*

(2) Introduction of New Quality Adjustment Methods

Name	Explanation of Methods
Attribute cost adjustment method	Method to assume the price difference in major parts between an old and new product as price change resulting from quality change, and to treat the remaining part of the price change as pure price change when judging that the sum of major parts' prices causing the difference in quality, is equal to the price of product.
Option cost method	Method to assume 50 percent of option prices of the old product as price change resulting from quality change, and to treat the remaining part of the price change as pure price change when the equipment regarded as an option in the old product, became to standard equipment in the new product.
Fuel efficiency method	Method to assume prices of the improved fuel efficiency converted into monetary amount as price change resulting from quality change, and to treat the remaining part of the price change as pure price change when main quality difference between an old and new product correspond to the one resulting from energy saving performance.
Webscraped prices comparison method	Method to assume 50 percent of the difference in webscraped retail prices between an old and new product as price change resulting from quality change, and to treat the remaining part of the price change as pure price change.

(3) Flowchart for Selecting Quality Adjustment Method



Note: For more details of *webscraped prices comparison method* , see Nobuhiro Abe, Yujiro Ito, Ko Munakata, Shinsuke Ohyama, Kimiaki Shinozaki (2016) "Pricing Patterns over Product Life-Cycle and Quality Growth at Product Turnover: Empirical Evidence from Japan," Bank of Japan Working Paper Series (No. 16-E-5).

List of Commodities: Revised Quality Adjustment Methods are Applicable

Group	Target commodities for application				Hedonic regression method	Attribute cost adjustment method	Option cost method	Fuel efficiency method	Webscraped prices comparison method
Electrical machinery & equipment	P			Electric rice cookers					○
			I	Microwave ovens					○
	P		I	Household refrigerators & freezers					○
	P		I	Room air conditioners					○
			I	Air cleaners					○
	P		I	Household washing machines					○
	P		I	Household vacuum cleaners					○
	P		I	Shavers, hair clippers & hair dryers					○
		E		Household electric equipment					○
Information & communications equipment	P		I	Cellular phones	○				○
		E		Fixed & mobile radio communications equipment	○				○
	P			Radio navigational aid apparatus for cars					○
		E	I	Radar apparatus & radio remote control apparatus and radio navigational aid apparatus for cars					○
	P		I	Television receivers	○				○
	P	E		Visual equipment	○				○
			I	Video recording and/or reproducing apparatus					○
			I	Digital cameras & video cameras	○				○
	P			Electric audio equipment					○
			I	Car audio equipment					○
			I	Home audio equipment					○
	P		I	Servers		○			
	P		I	Desktop computers	○				○
	P	E	I	Notebook computers	○				○
	P	E	I	External storages					○
	P	E	I	Computer printers					○
	P		I	Computer monitors					○
Transportation equipment	P			Mini passenger cars			○	○	
	P	E	I	Small passenger cars (gasoline cars)	○		○	○	
	P			Small passenger cars (hybrid cars)	○		○	○	
	P	E	I	Standard passenger cars (gasoline cars)	○		○	○	
	P			Standard passenger cars (hybrid cars)	○		○	○	
	P			Passenger vehicles (clean energy vehicles)			○	○	
		E	I	Passenger vehicles (hybrid & clean energy vehicles)	○		○	○	
	P	E		Buses			○	○	
	P			Mini trucks			○	○	
	P	E		Small trucks			○	○	
	P	E		Standard trucks			○	○	
	P			Motor vehicles for special-use			○	○	
	P	E	I	Motorcycles			○	○	

Note: "P," "E," and "I" represent the Producer Price Index, the Export Price Index, and the Import Price Index, respectively.

Track Record of Application of Revised Quality Adjustment Methods (January 2015 to October 2016)

(1) Expanding the Scope for Application of the Hedonic Regression Method

cases

	Total	Producer Price Index	Export Price Index	Import Price Index
Passenger cars	16	7	4	5
Smartphones	4	2	—	2
LCD Televisions	14	8	—	6

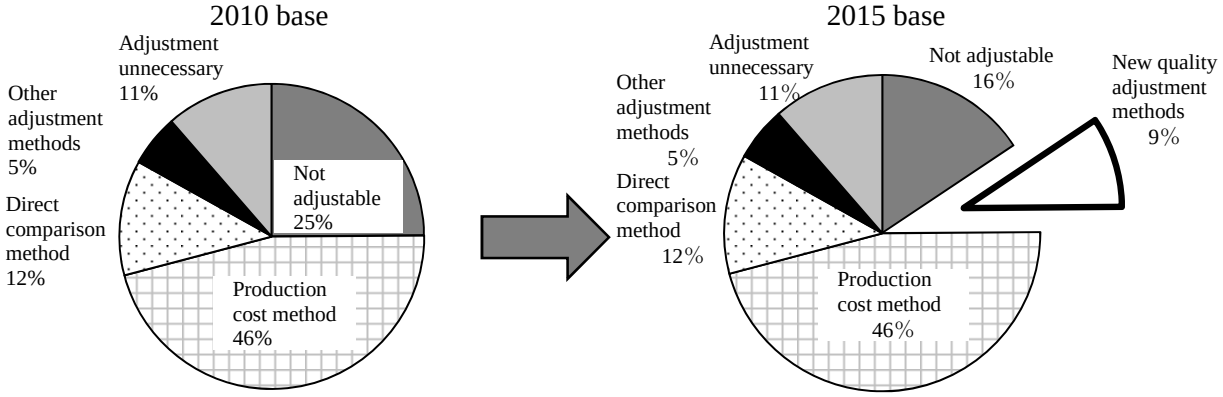
(2) Application of New Quality Adjustment Methods

cases

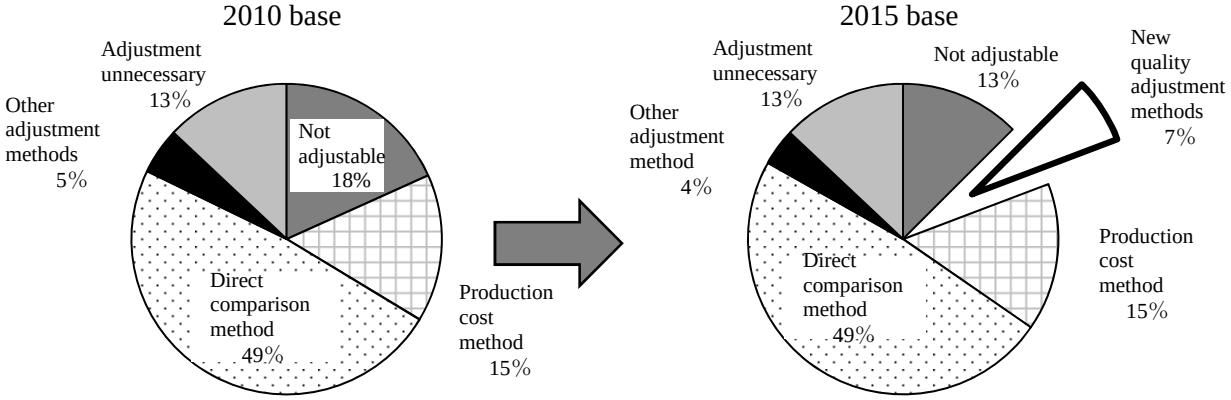
	Total	Producer Price Index	Export Price Index	Import Price Index
Attribute cost adjustment method	0	0	—	0
Option cost method	2	2	0	0
Fuel efficiency method	8	8	0	0
Webscraped prices comparison method	15	7	2	6

(3) Changes in the Composition of Applied Quality Adjustment Method

Motor vehicles



Household electric equipment/Information & communications equipment except for the commodities applied the hedonic regression method to in the 2010 base

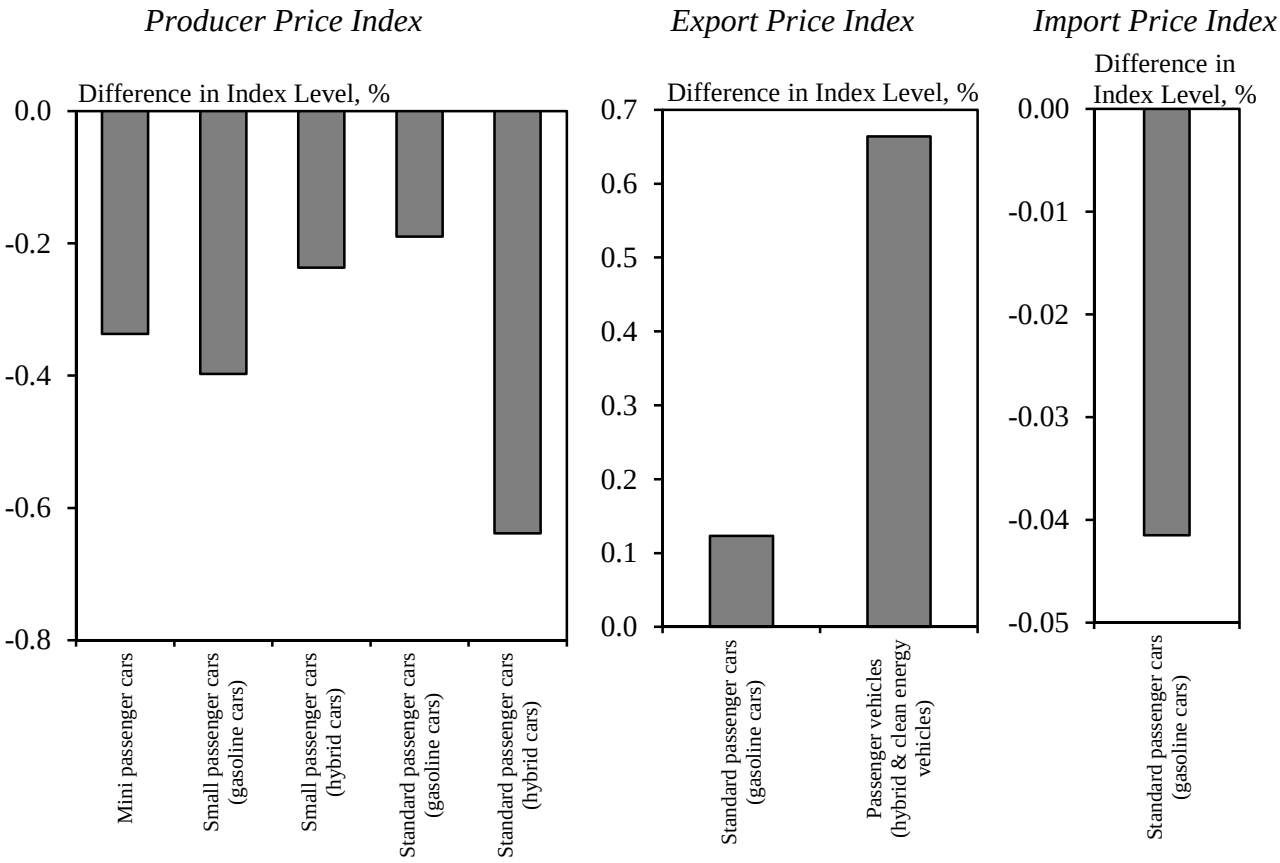


Notes: 1. "Motor vehicles" includes "Passenger cars," "Buses," "Trucks," and "Motorcycles" in the CGPI. "Household electronic equipment/Information & communications equipment" includes "Microwave ovens," "Household refrigerators & freezers," "Room air conditioners," "Household washing machines," "Household vacuum cleaners," "Shavers, hair clippers & hair dryers," "Cellular phones," "Television receivers," "Car audio equipment," "Home audio equipment," "Computer storage devices using magnetic disks," "Video recording and/or reproducing apparatus" in the PPI and IPI; "Electric rice cookers" in the PPI; "Household electric equipment" and "External storage" in the EPI.

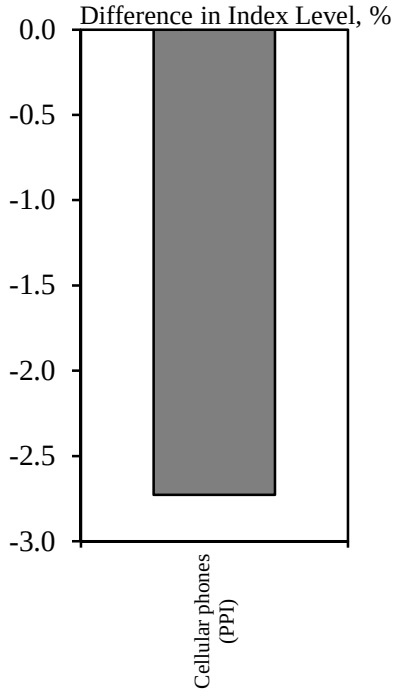
2. Components of "New quality adjustment methods" in (3) are aggregates of "the number of applications of the *hedonic regression method* to newly applicable commodities" and "the number of applications of the *option cost method* /the *fuel efficiency method* /the *webscraped prices comparison method* " to the total numbers of sample price replacements, respectively. (Sample price replacements classified as "not adjustable" and "other adjustment methods" in the 2010 base index can be classified into "New quality adjustment methods" in the 2015 base.) "Adjustment unnecessary" includes the cases where some terms except for the quality of product (such as reporting company) are changed.

Impact on Indexes of Revised Quality Adjustment Methods

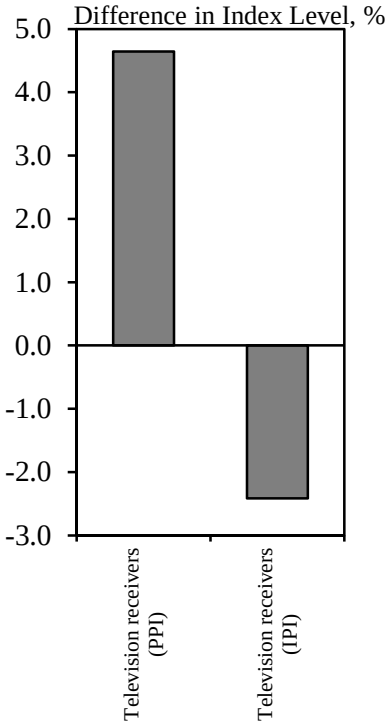
(1) Passenger cars



(2) Cellular phones



(3) Television receivers



Note: The differences refer to the comparison between the "2015 base index" and the "pro forma 2015 base index in cases where applied quality adjustment methods are changed from the *hedonic regression method* /the *option cost method* /the *fuel efficiency method* to other methods." They are calculated by equalizing their levels for January 2015 and comparing the levels of both indexes in October 2016.

List of Newly Introduced External Statistics/Database in the CGPI

(1) Producer Price Index

Group	Commodity	Product	Source
Chemicals & related products	Benzene	Benzene, Taiwan/Korea/Southeast Asia, Spot	S&P Global Platts/ Petrochemical Alert
	Para-xylene	Para-xylene, Taiwan/Korea/Southeast Asia, Spot	
Ceramic, stone & clay products	Concrete pipes	Centrifugal reinforced concrete pipes Pipes for Sewer jacking method	Construction Research Institute/ Construction & Material Costs in Japan
	Prestressed concrete products	Box culverts for roads, rivers and utility tunnels Floor slab for bridge	
Agriculture, forestry & fishery products	Brown rice	Nonglutinous brown rice	Ministry of Agriculture, Fishery and Forestry/Negotiated Transaction Price and Quantity

(2) Export Price Index

Group	Commodity	Product	Source
Chemicals & related products	Benzene	Benzene, Taiwan/Korea/Southeast Asia, Spot	S&P Global Platts/ Petrochemical Alert
	Toluene	Toluene, Taiwan/Korea/China, Spot	
	Xylene	Xylene, Taiwan/Korea/China, Spot	
	Para-xylene	Para-xylene, Taiwan-China/Korea/Southeast Asia, Spot	
Transportation equipment	Steel ships	Cargo ship Transport ship	Ministry of Land, Infrastructure, Transport and Tourism/Monthly Report of Shipbuilding Statistics
Other primary products & manufactured goods	Gasoline	Premium gas Regular gas	Bloomberg
	Jet fuel oil & kerosene	Light oils and preparations (kerosene) Other (kerosene)	Ministry of Finance/ Trade Statistics
	Gas oil	Gas oil/50PPM	Bloomberg
	Fuel oil C	380-cSt fuel 180-cSt fuel	

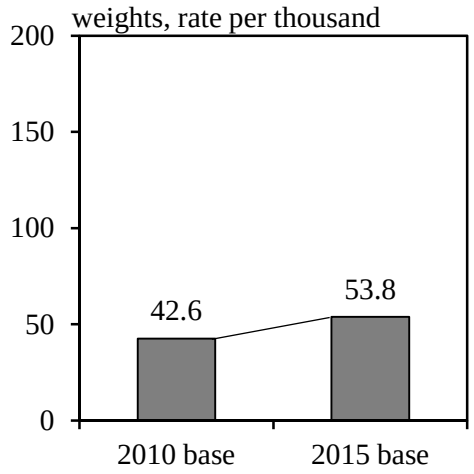
(3) Import Price Index

Group	Commodity	Product	Source
Beverages & foods and agriculture products for food	Corn	Tokyo, US-production, Nearby Month	Nikkei Digital Media/ NEEDS-FinancialQUEST
	Coffee beans	New York, Arabica, Nearby Month London, Robusta, Nearby Month	
Chemicals & related products	Methanol	Methanol, China/Korea/Southeast Asia, Spot	S&P Global Platts/Petrochemical Alert
Metals & related products	Iron ores	Mine smalls (iron content 62 percent)	Japan Metal Daily
	Zinc ores	unwrought zinc	Bloomberg, CME Group
	Molybdenum ores	Molybdenum, spot	S&P Global Platts/Metals weekly
Petroleum, coal & natural gas	Naphtha	Naphtha	Bloomberg
	Gasoline	Premium gas Regular gas	
	Jet fuel oil & kerosene	Jet fuel oil	
	Fuel oil C	380-cSt fuel 180-cSt fuel	
	Coal for coke making	Heavy coking coal	Japan Metal Daily
	Liquefied petroleum gas	Natural gas	Ministry of Finance/Trade Statistics
Other primary products & manufactured goods	Natural rubber	Singapore rubber RSS No.3 Singapore rubber TSR No.20	Nikkei Digital Media/ NEEDS-FinancialQUEST

Share of Commodities Utilizing External Statistics/Database

(1) Producer Price Index

Share



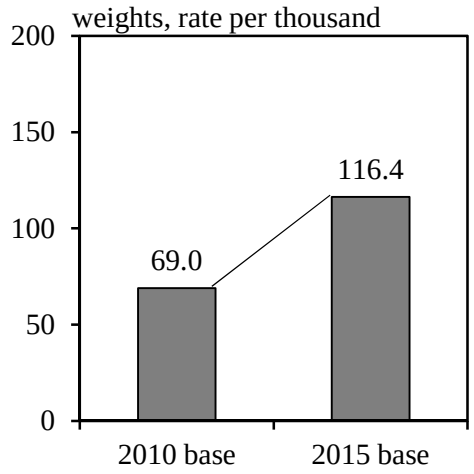
By Group

%, % pt.

	2010 base	2015 base	Difference
All commodities	4.3	5.4	1.1
Lumber & wood products	28.0	27.2	(0.9)
Chemicals & related products	30.9	34.4	3.5
Ceramic, stone & clay products	29.1	34.8	5.7
Electronic components & devices	5.2	5.3	0.1
Agriculture, forestry & fishery products	9.7	26.3	16.5
Minerals	0.0	46.2	46.2

(2) Export Price Index

Share



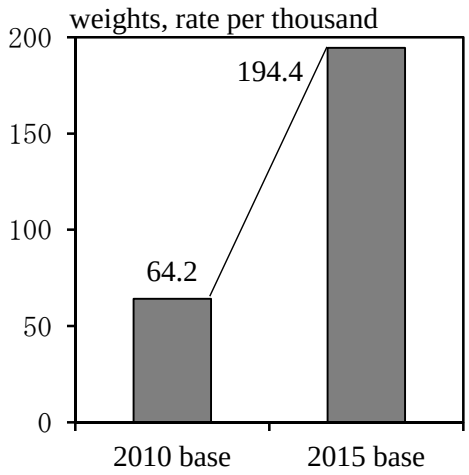
By Group

%, % pt.

	2010 base	2015 base	Difference
All commodities	6.9	11.6	4.7
Metals & related products	16.9	20.2	3.3
Chemicals & related products	31.7	35.4	3.7
Electric & electronic products	8.1	8.6	0.5
Transportation equipment	0.0	7.9	7.9
Other primary products & manufactured goods	0.0	19.7	19.7

(3) Import Price Index

Share



By Group

%, % pt.

	2010 base	2015 base	Difference
All commodities	6.4	19.4	13.0
Beverages & foods and agriculture products for food	14.8	22.9	8.1
Metals & related products	22.9	38.7	15.8
Petroleum, coal & natural gas	0.0	44.3	44.3
Chemicals & related products	4.6	12.8	8.2
Electric & electronic products	12.2	6.4	(5.8)
Other primary products & manufactured goods	0.0	3.0	3.0

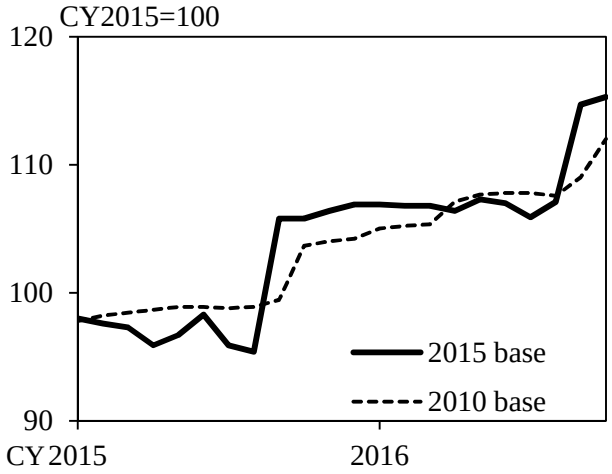
Notes: 1. The share is calculated based on weights.

2. The labelling of groups is based on the classification of the 2015 base index.

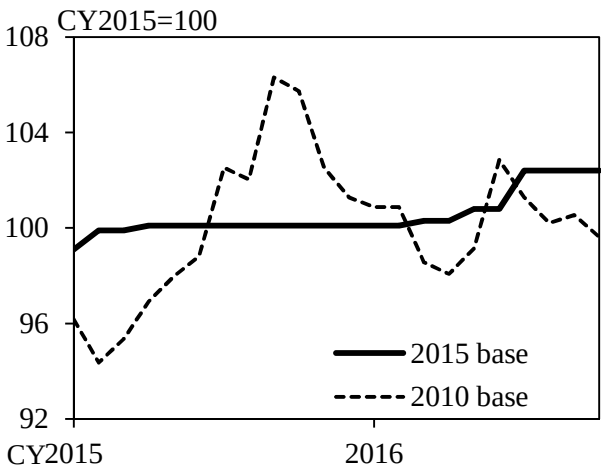
Trends of Indexes for Commodities Introducing External Statistics/Database

(1) Producer Price Index

"Brown rice"

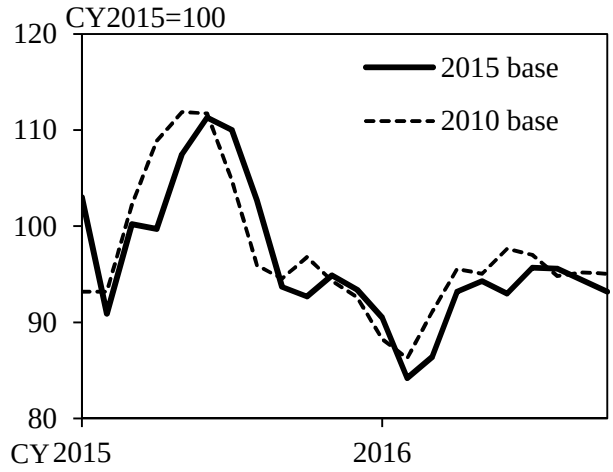


"Prestressed concrete products"

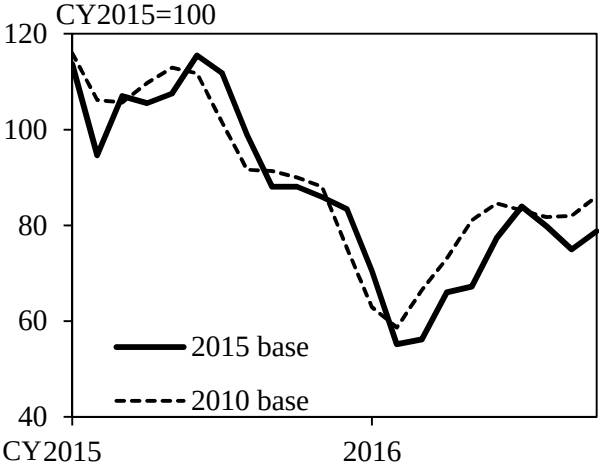


(2) Export Price Index

"Para-xylene"

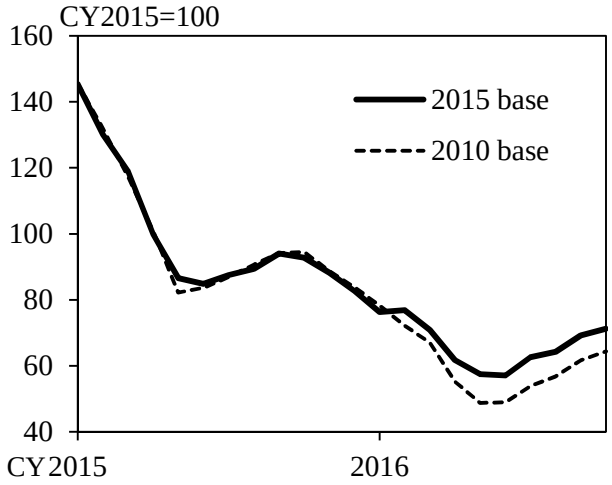


"Gas oil"

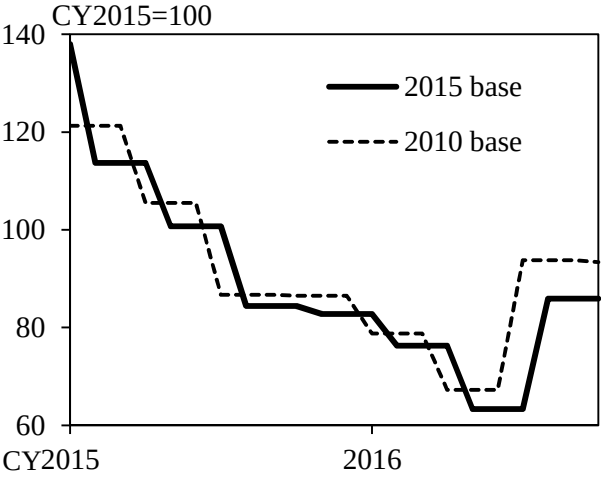


(3) Import Price Index

"Liquefied natural gas"



"Iron ores"



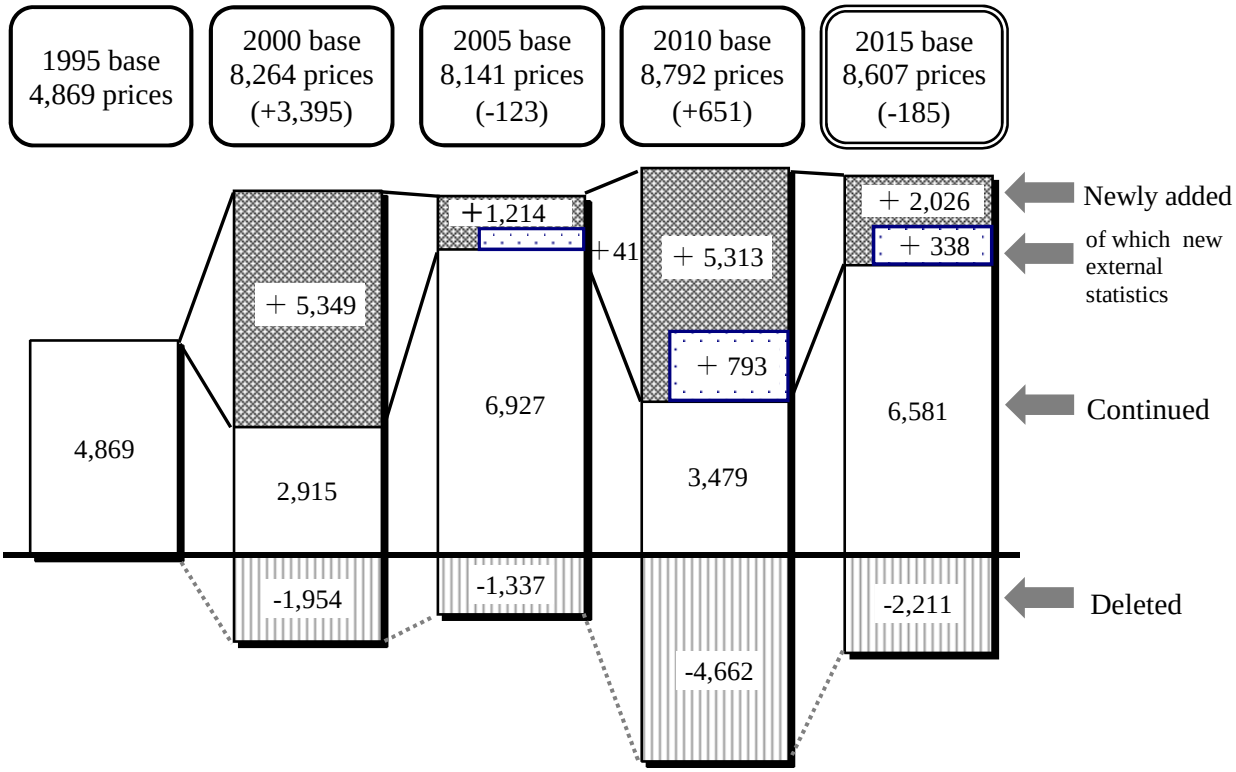
Note: The data in (2) and (3) are on the contract currency basis.

Number of Sample Prices and Price Survey Methods

(1) Number of Sample Prices

	Total	Producer Price Index	Export Price Index	Import Price Index
2015 base (A)	8,607	5,743	1,288	1,576
2010 base (B)	8,792	5,977	1,277	1,538
Difference (A-B)	-185	-234	11	38

(2) Replacement of Sample Prices (Total of PPI, EPI and IPI)



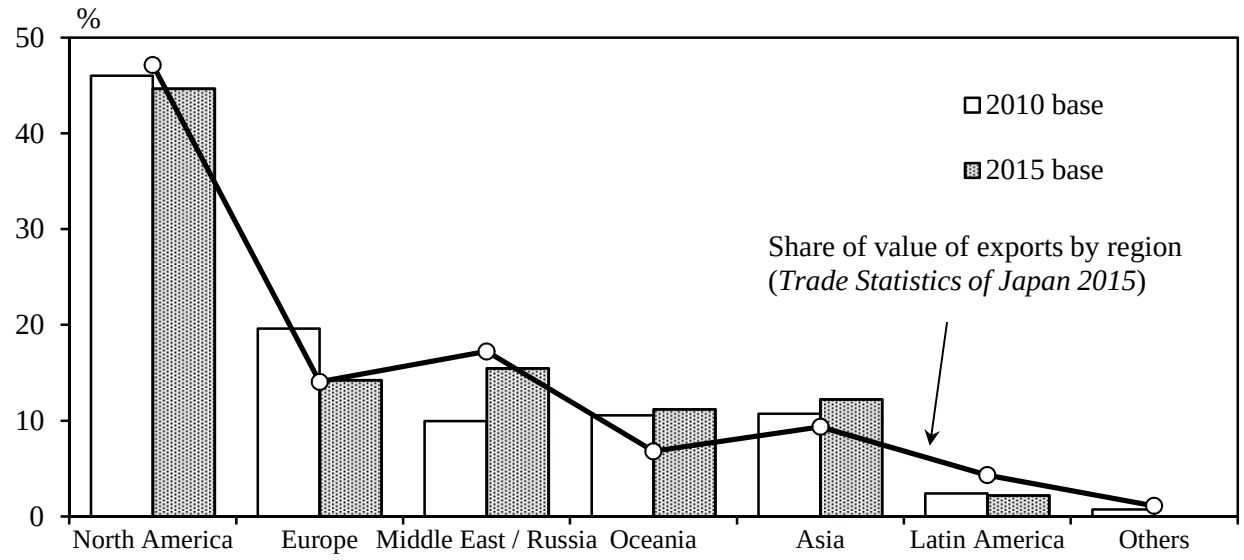
(3) Revisions of Price Survey Methods (Producer Price Index)

Pricing method	Number of sample prices (component ratio)		
	2010 base	2015 base	Difference in component ratio
Direct use of prices of repeated transactions	2,965 (56%)	2,843 (57%)	+2 %
Unit value method	1,661 (31%)	1,332 (27%)	-4 %
Markup method	145 (3%)	139 (3%)	0 %
List price method	190 (3%)	164 (3%)	0 %
External statistics / database, etc.	368 (7%)	491 (10%)	+3 %

Notes: 1. Figures for the 2010 base index are as of April 2010 and those for the 2015 base index are as of October 2016.
2. Component ratios in (3) are calculated based on the number of sample prices excluding the sample prices in commodity class "Ethical pharmaceutical products" (648 in 2010 base, 774 in 2015 base). "External statistics/database, etc." includes a part of price survey methods classified as "Model pricing method" and " Feeling pricing method", etc. as well as price survey by using external statistics/database.

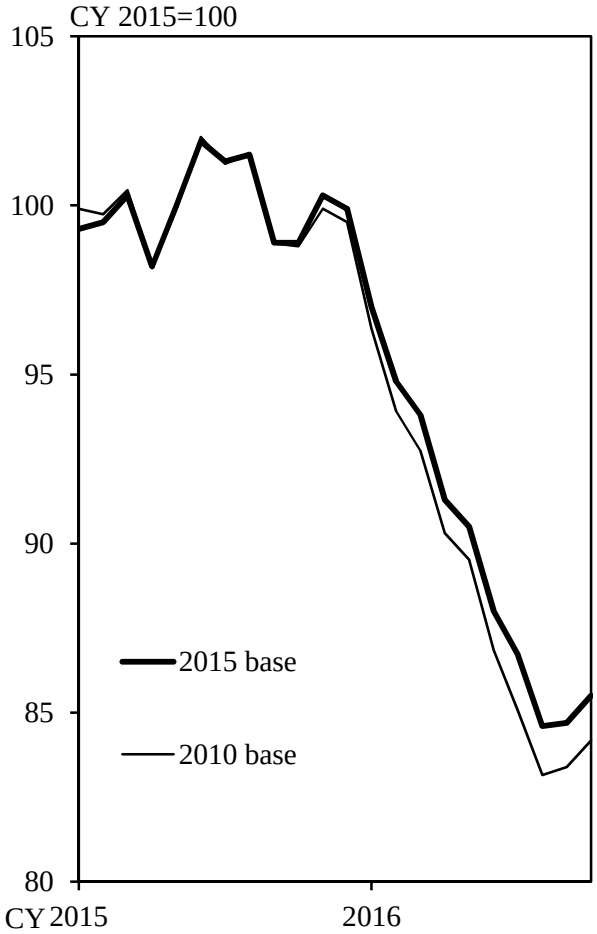
Improvement in Composition of Sample Prices: Export Price Index "Passenger cars"

(1) Change in Component Ratio of Export Destination by Region

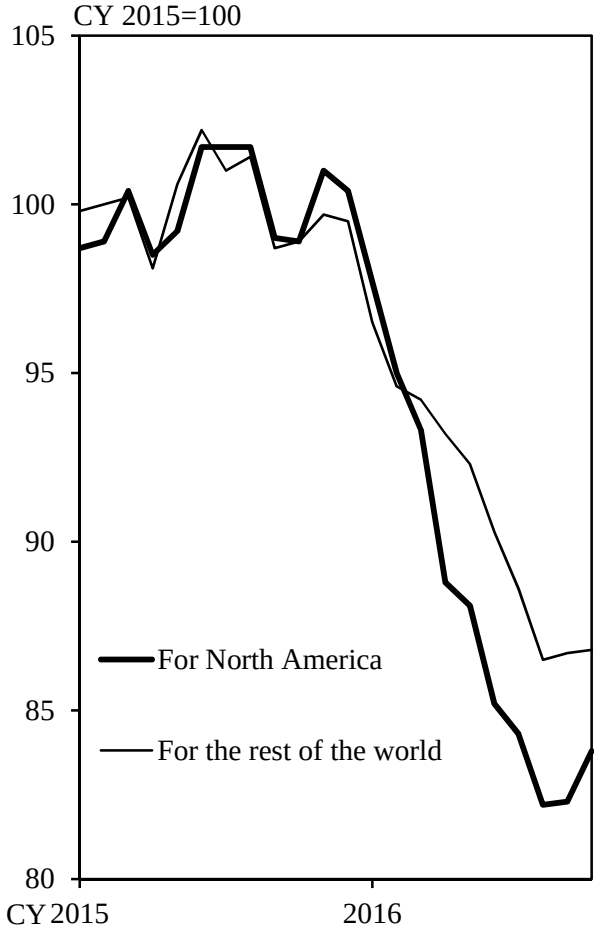


(2) Price Developments (Yen Basis)

Old and New Indexes



Index by Region

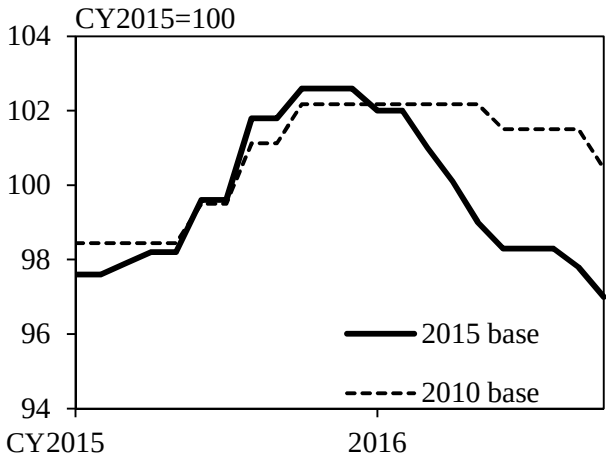


Note: The component ratio in (1) is calculated based on weights.
Source: Ministry of Finance "Trade Statistics of Japan."

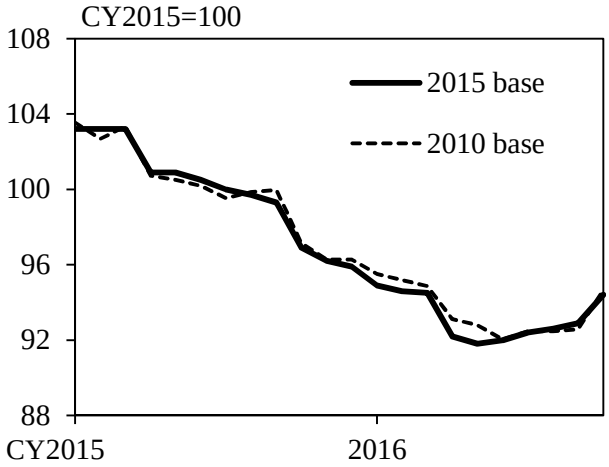
Impact of Sample Price Revisions: Producer Price Index

Improvement in Composition of Sample Prices

(1) "Paper kraft pulp"

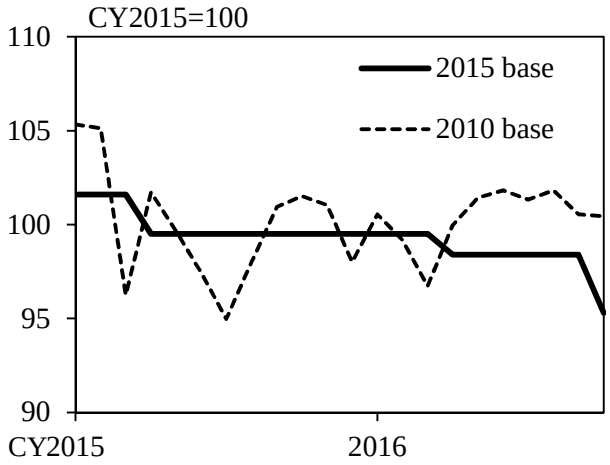


(2) "Hot-dip zinc-coated steel sheets"

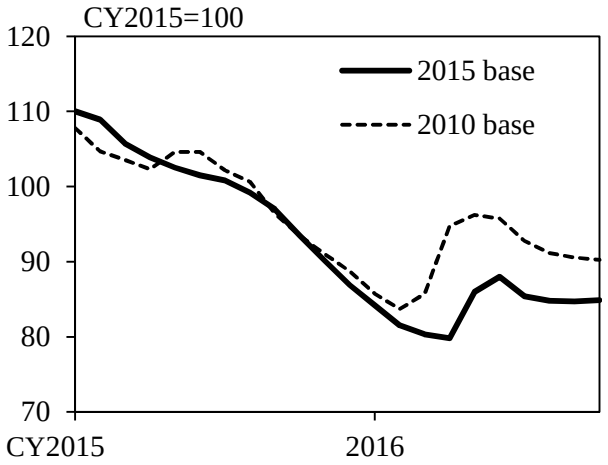


Uniformity of Stage and Time of Price Collection & Improvement in Composition of Sample Prices

(3) "Electric meters"

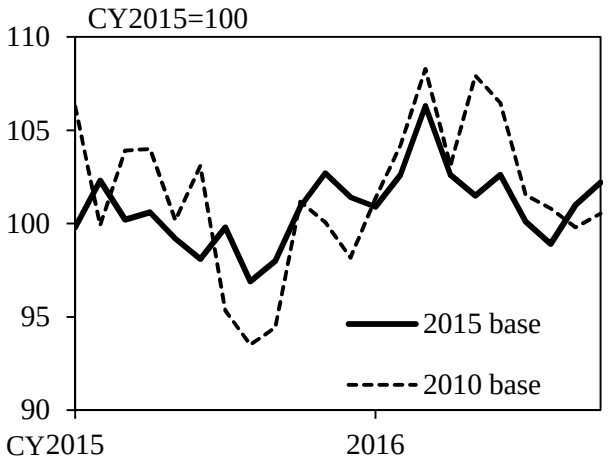


(4) "Light steel bars"

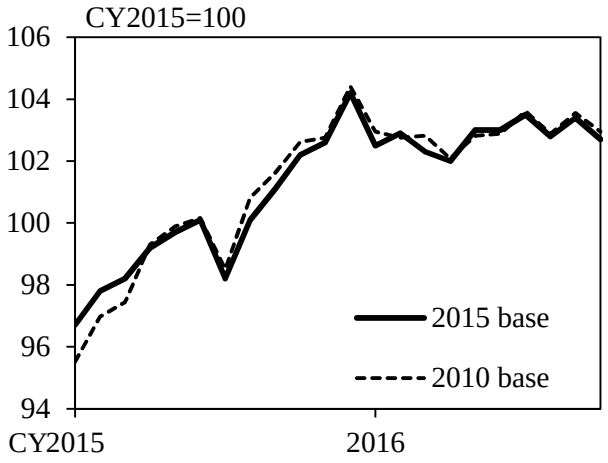


Revision of Price Survey Methods

(5) "Mold, die & parts"



(6) "Steelworks"

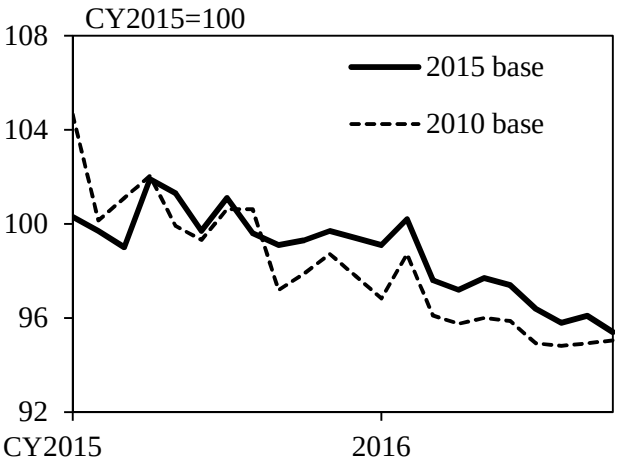


Impact of Sample Price Revisions: Export/Import Price Index

Improvement in Composition of Sample Prices

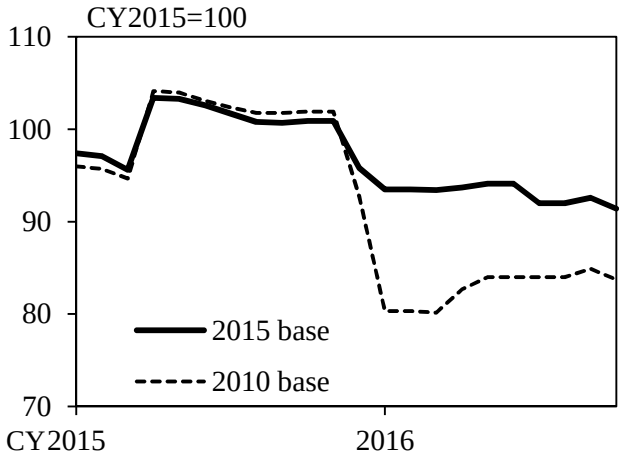
(Export Price Index)

(7) "MOS integrated circuits (except MOS memory integrated circuits)"

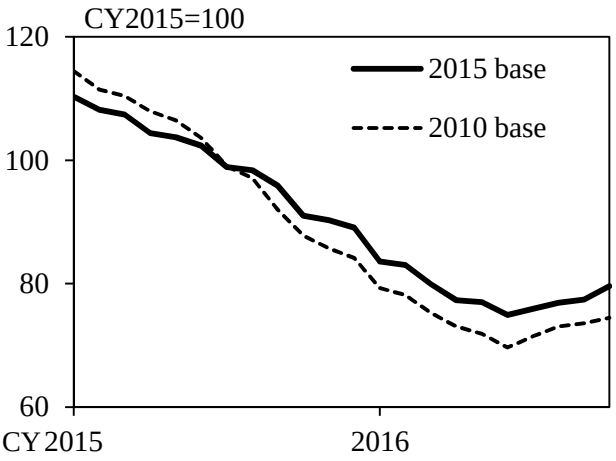


(Import Price Index)

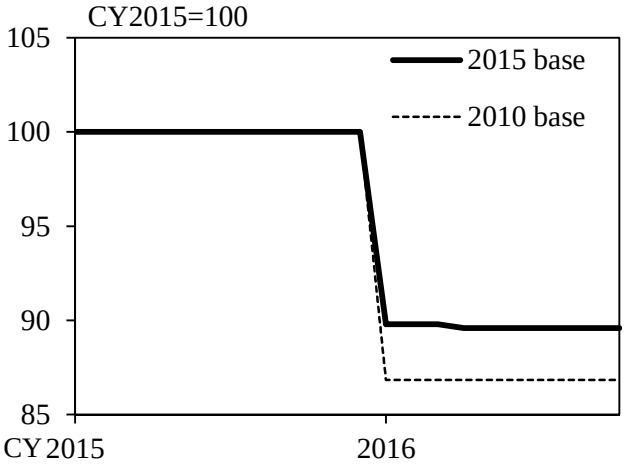
(8) "Cellular phones"



(9) "MOS memory integrated circuits "



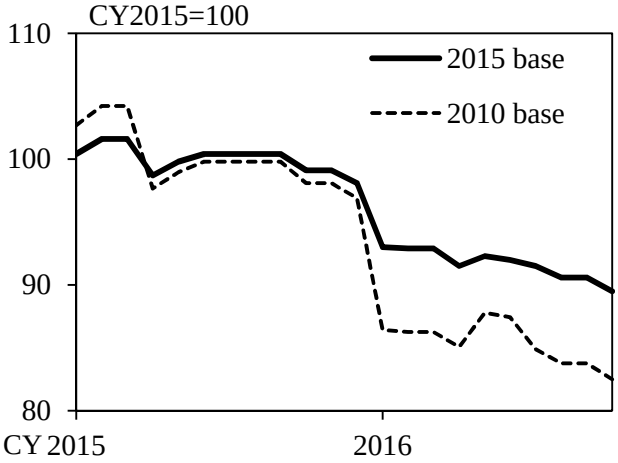
(10) "Medical supplies"



Revision of Price Survey Methods

(Import Price Index)

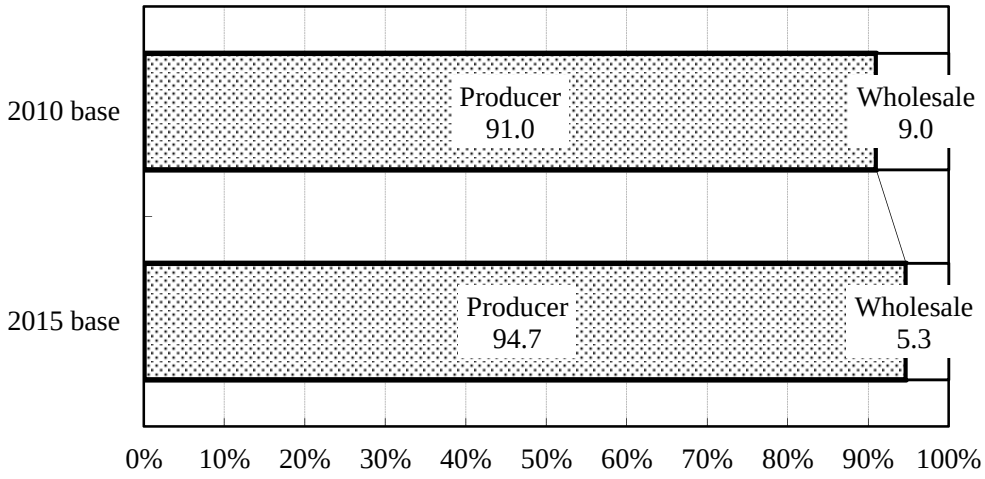
(11) "Metal valves"



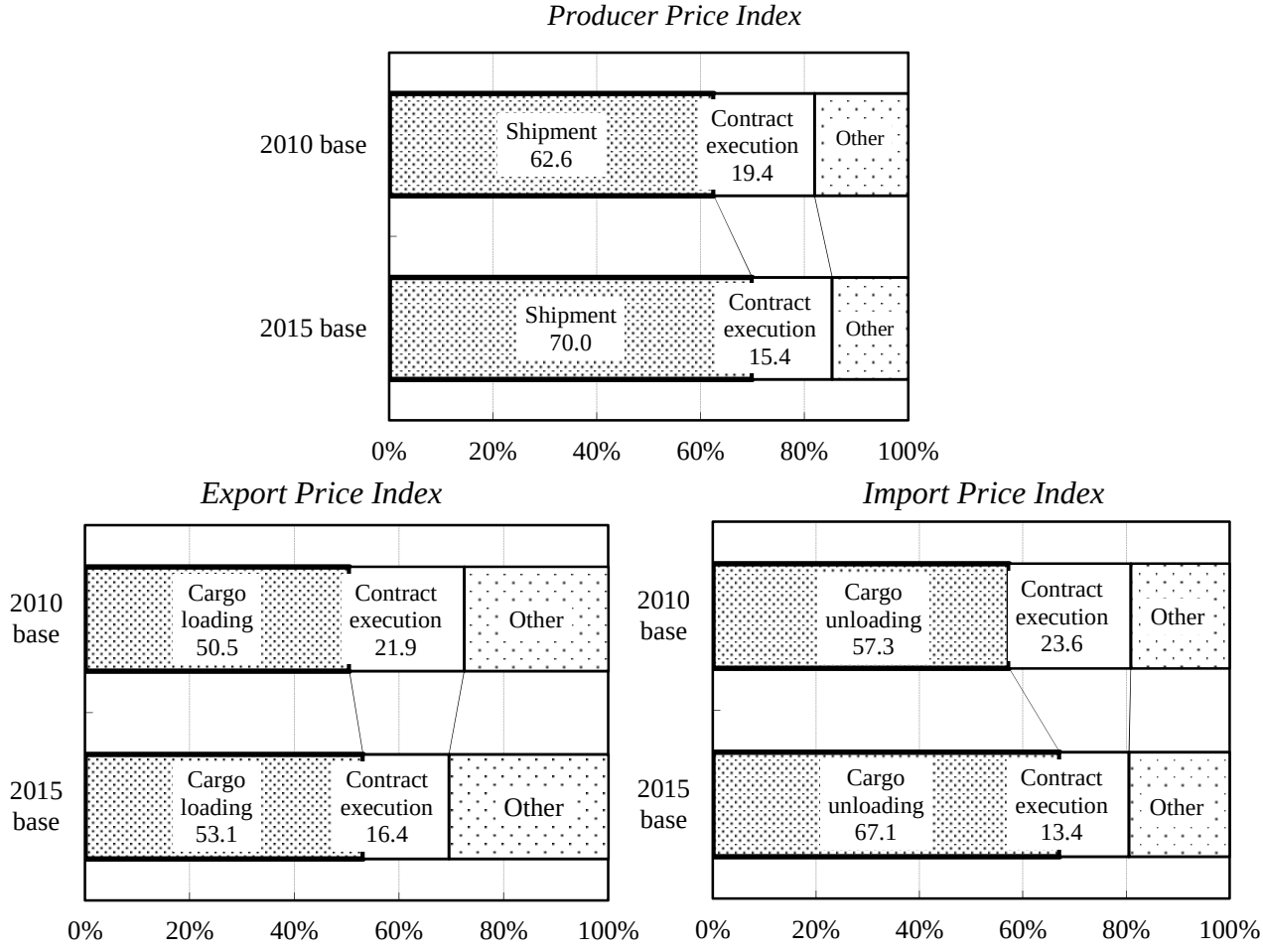
Note: All data are on the contract currency basis.

Changes in Stage and Timing of Price Collection

(1) Stages of Price Collection for the Producer Price Index



(2) Timing of Price Collection for the Corporate Goods Price Index



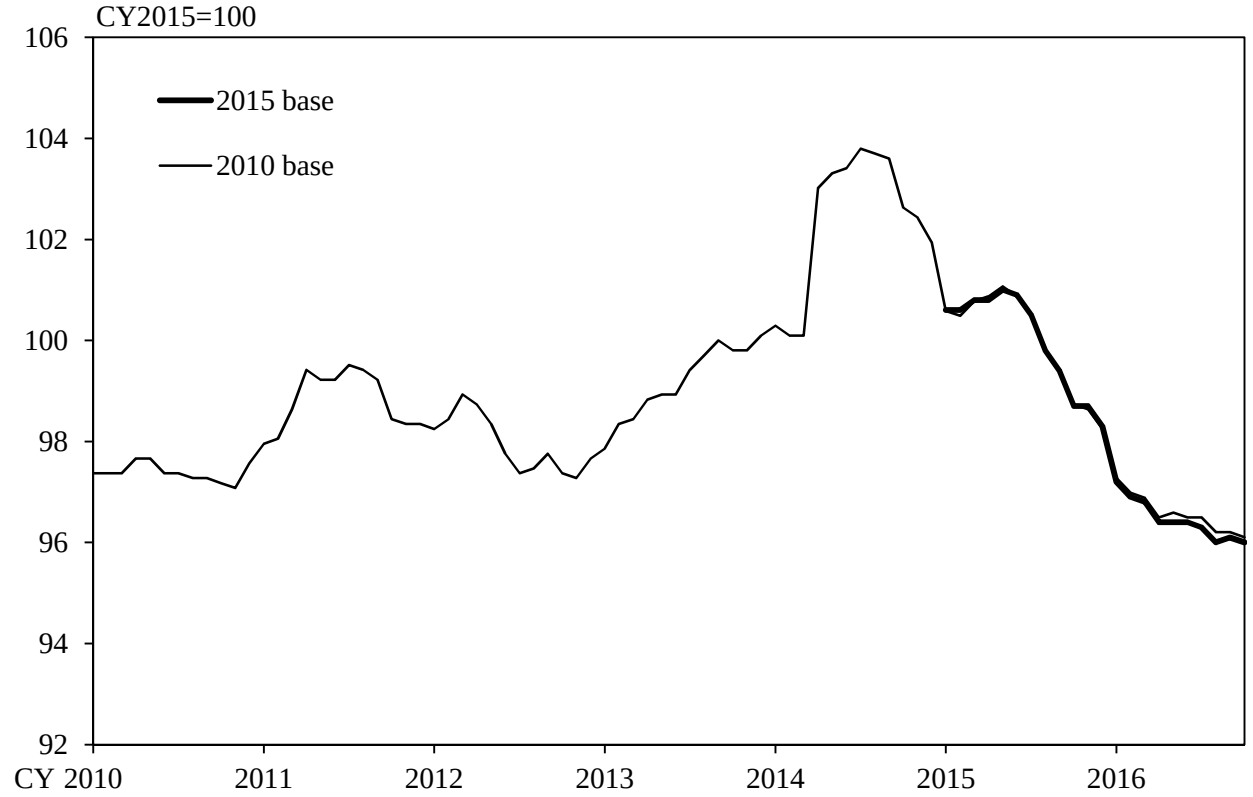
Notes: 1. Figures indicate the share of sample prices calculated on a weight basis. Figures for the 2010 base index are as of April 2012, those for the 2015 base index are as of October 2016.

2. Figures for the 2015 base index in (1) exclude sample prices using external statistics/database and average prices of sample prices in the producer and wholesale stages. A few sample prices in group "Beverages & foods" are surveyed in the retail stage. These prices are classified as the prices in the wholesale stage.

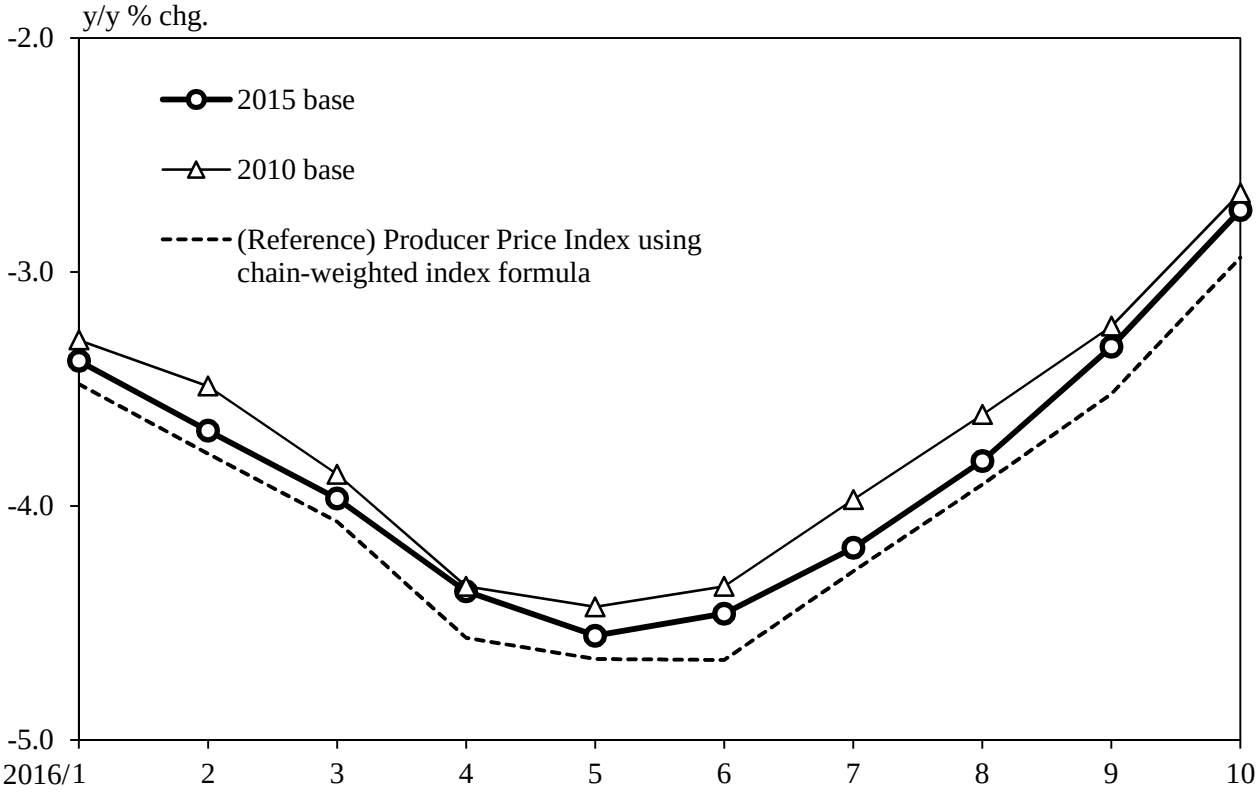
3. "Other" in (2) includes the following;
PPI: time of payment, etc. EPI: cargo unloading, and time of payment, etc. IPI: cargo loading and time of payment, etc.
Sample prices using external statistics/database and prices in the wholesale stage in the PPI are also included in "other."

Comparison between the Old and New Indexes: Producer Price Index

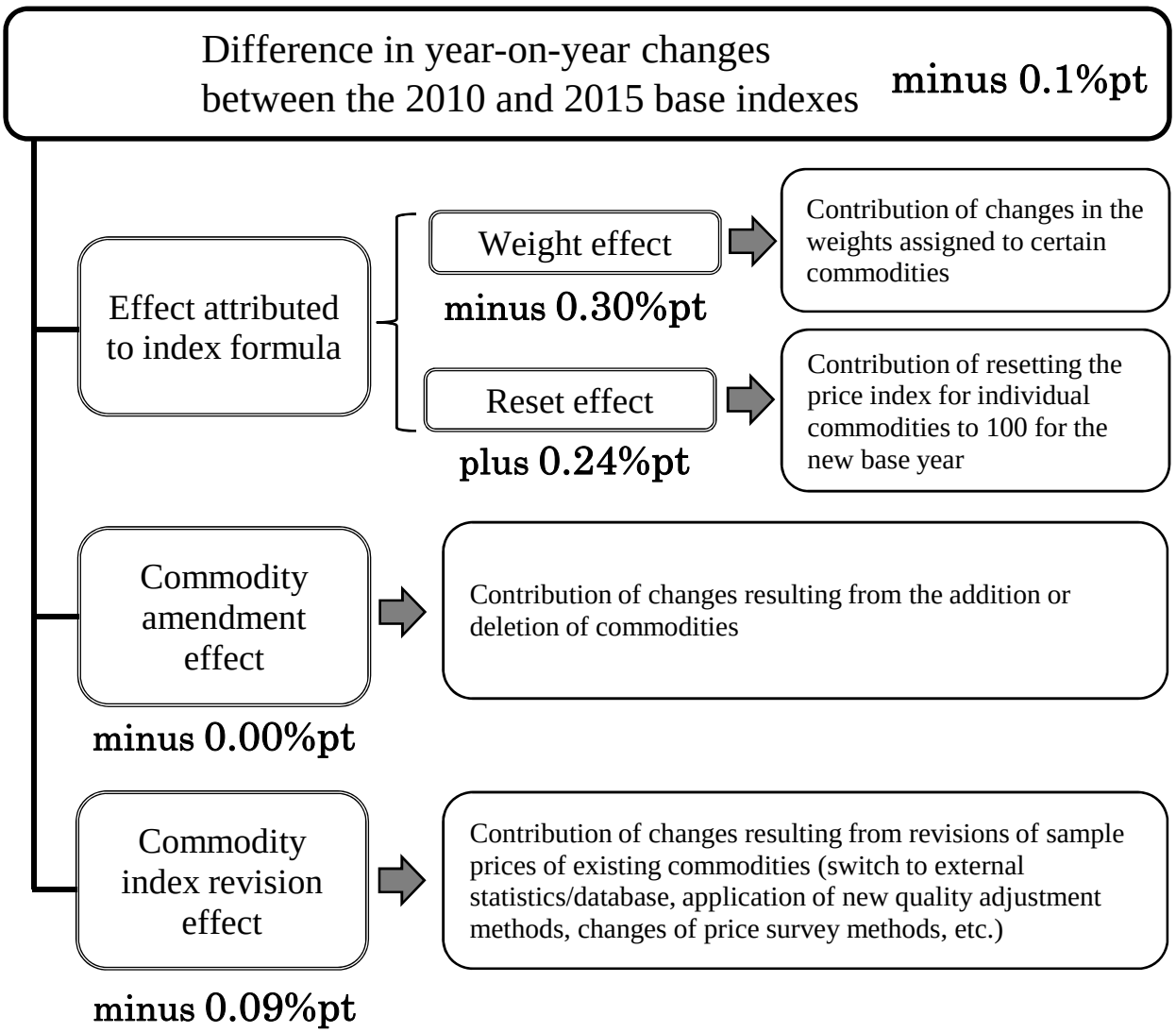
(1) Level (All Commodities)



(2) Year-on-Year Change (All Commodities)



Concept of Decomposition of the Difference in Year-on-Year Changes between the Old and New Indexes



Notes:1. Figures above are the contributions to the difference in the year-on-year changes between 2010 and 2015 base indexes. (Average between January to October 2016).

2. Weight effect and reset effect, where the latter includes interaction term, are calculated as follows:

Contributions to the difference in the y/y changes in 2015 base（Commodity i）：

$$\frac{p_{16,i}-p_{15,i}}{P_{15}} \times w_{15,i} = \frac{p_{15,i}}{P_{15}} \times \pi_{16,i} \times w_{15,i}$$

Contributions to the difference in the y/y changes in 2010 base（Commodity i）：

$$\frac{p'_{16,i}-p'_{15,i}}{P'_{15}} \times w_{10,i} = \frac{p'_{15,i}}{P'_{15}} \times \pi_{16,i} \times w_{10,i}$$

Weight effect and reset effect（Commodity i）：

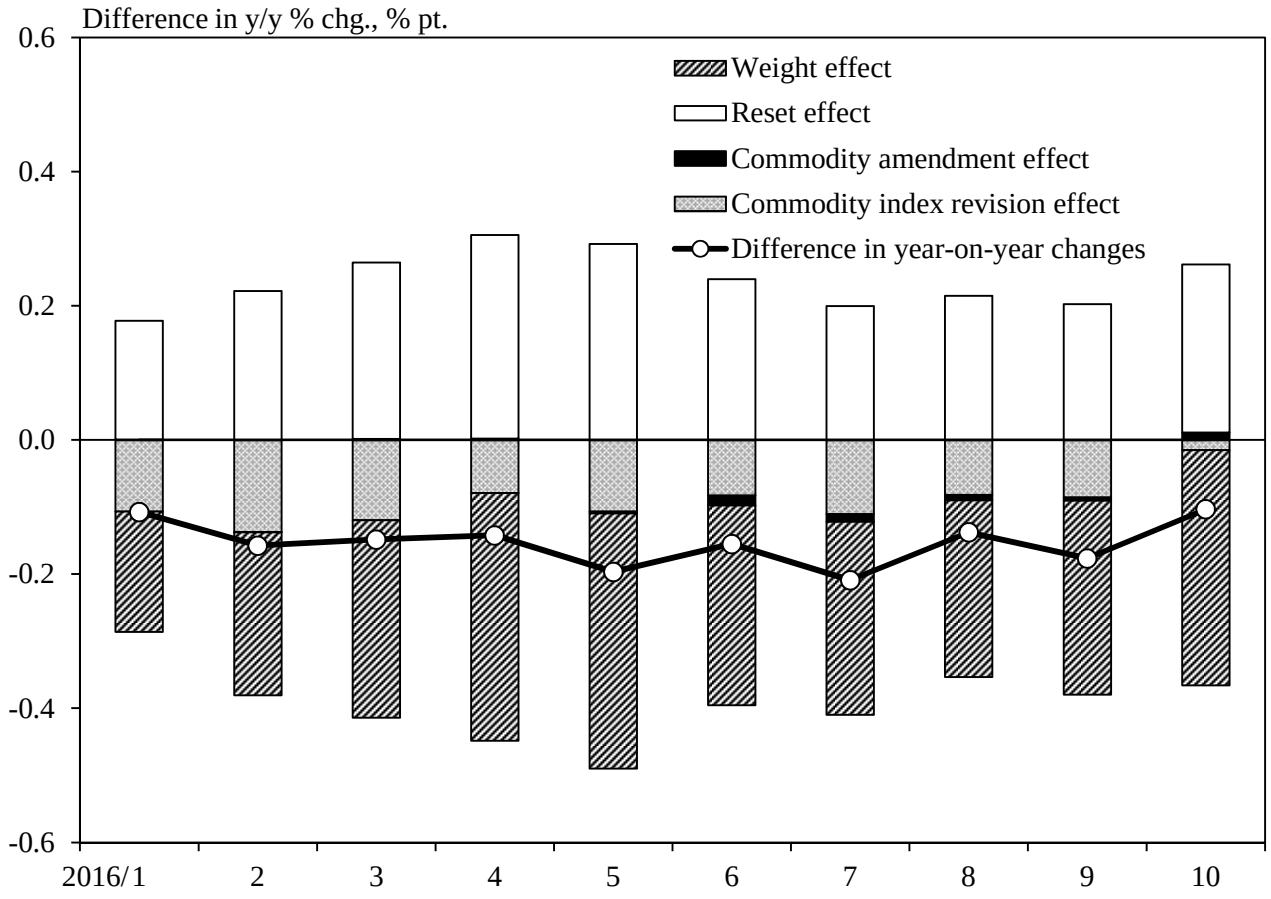
$$\underbrace{(w_{15,i}-w_{10,i}) \times \pi_{16,i} \times \frac{p'_{15,i}}{P'_{15}}}_{\text{weight effect}} + \underbrace{\left(\frac{p_{15,i}}{P_{15}}-\frac{p'_{15,i}}{P'_{15}}\right) \times \pi_{16,i} \times w_{10,i}}_{\text{reset effect (narrow sense)}} + \underbrace{(w_{15,i}-w_{10,i}) \times \left(\frac{p_{15,i}}{P_{15}}-\frac{p'_{15,i}}{P'_{15}}\right) \times \pi_{16,i}}_{\text{interaction term}}$$

$$\underbrace{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}_{\text{reset effect}}$$

$p_{15,i}$ and $P_{15,i}$ represent price levels of commodity i and of index in 2015, respectively. $w_{10,i}$, $w_{15,i}$ represent weights of 2010 and 2015 base indexes of commodity i, respectively. $\pi_{16,i}$ is y/y changes of commodity i in 2016. "p'" indicates the old index.

Decomposition of Difference in Year-on-Year Changes between the Old and New Indexes: Producer Price Index

(1) Decomposition of Difference in Year-on-Year changes (All Commodities)

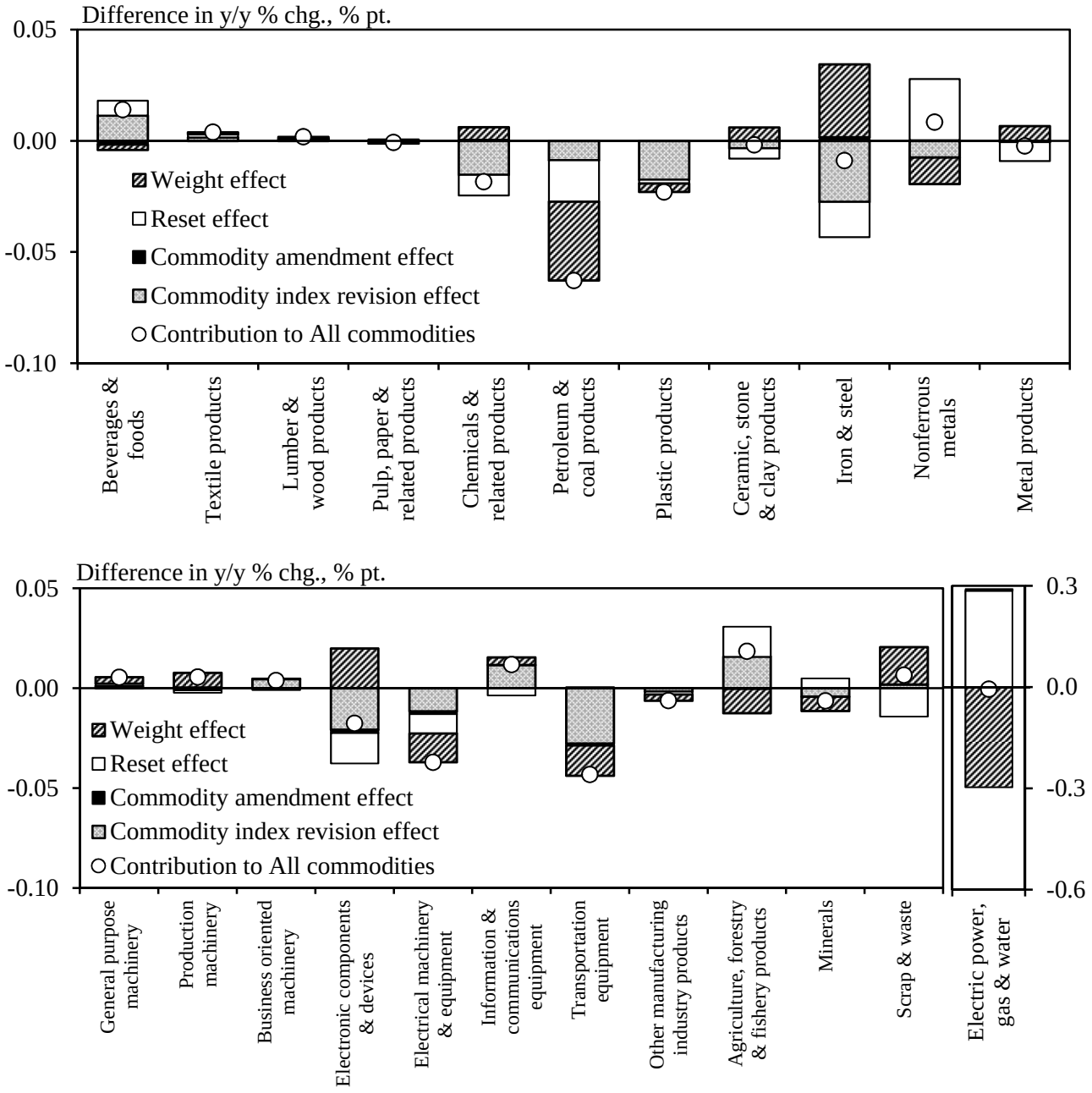


(Average between January 2016 and October 2016) % pt.

Difference in y/y % chg.	Weight effect	Reset effect	Commodity amendment effect	Commodity index revision effect
minus 0.1	minus 0.30	plus 0.24	minus 0.00	minus 0.09

Decomposition of Difference in Year-on-Year Changes between the Old and New Indexes: Producer Price Index (Cont'd)

(2) Decomposition by Groups (Average of Every Month from January 2016 to October 2016)



(3) Contribution of Commodity Index Revision Effect

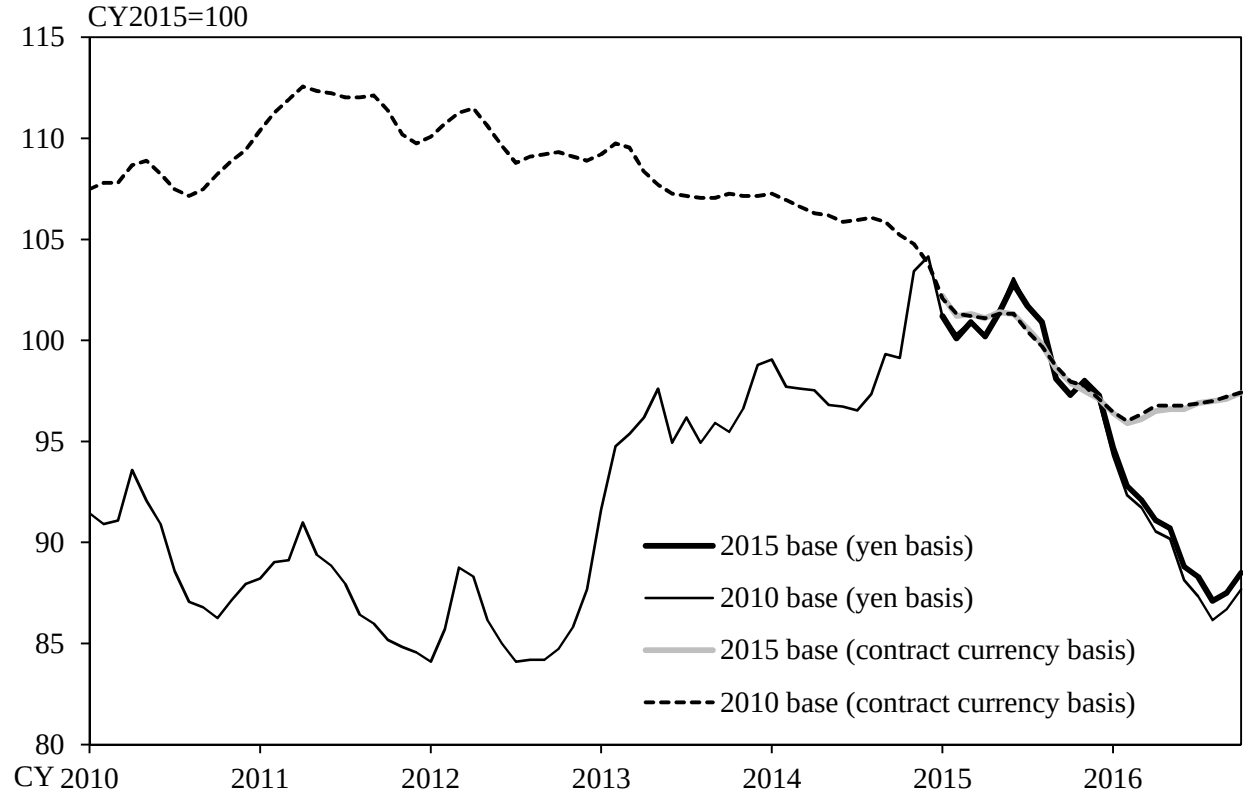
% pt.

Groups	Contribution to All commodities	Main commodities
Transportation equipment	minus 0.028	Aircraft parts, Standard passenger cars (hybrid cars)
Iron & steel	minus 0.027	Light steel bars
Electronic components & devices	minus 0.021	Printed circuit boards, Connecting components, Image sensing devices
Plastic products	minus 0.017	Plastic films & sheets
⋮	⋮	⋮
All commodities	minus 0.092	

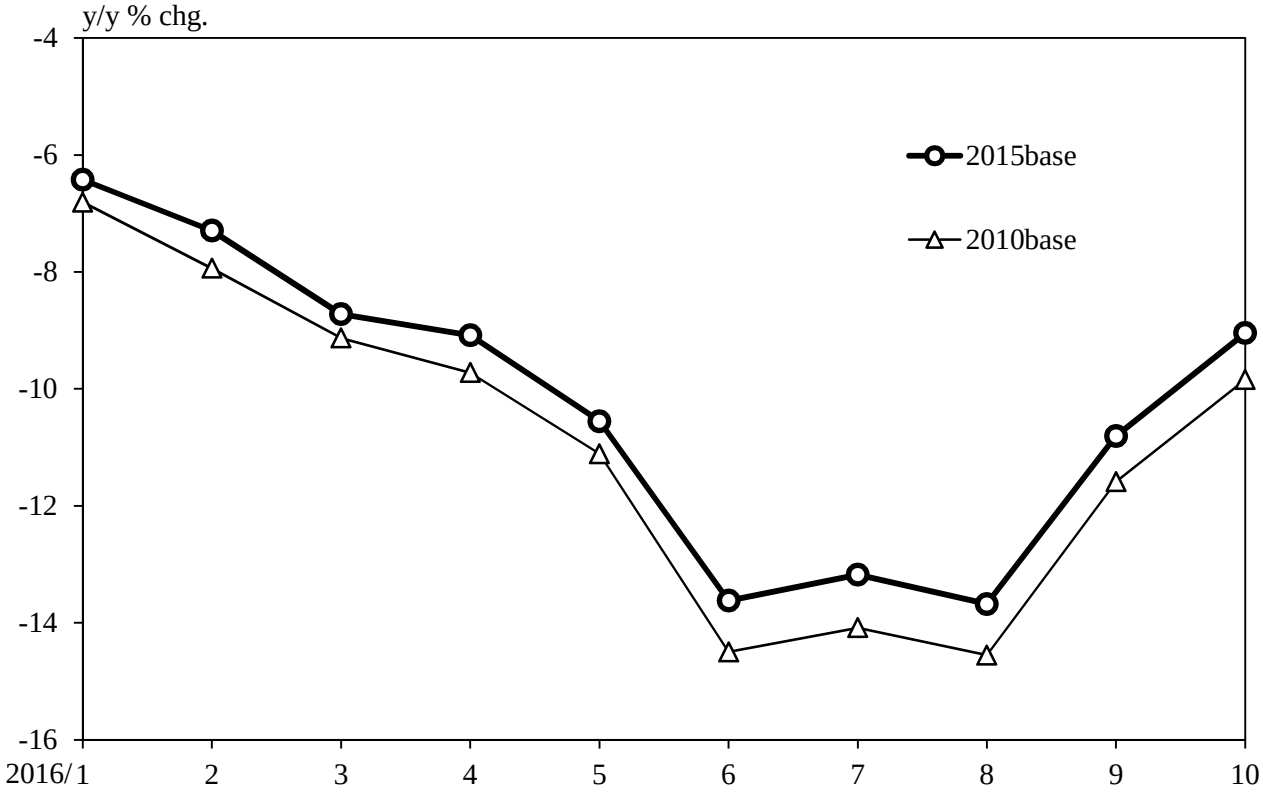
Note: "Electric power, gas & water" in (2) corresponds to the right scale.

Comparison between the Old and New Indexes: Export Price Index

(1) Level (All Commodities)

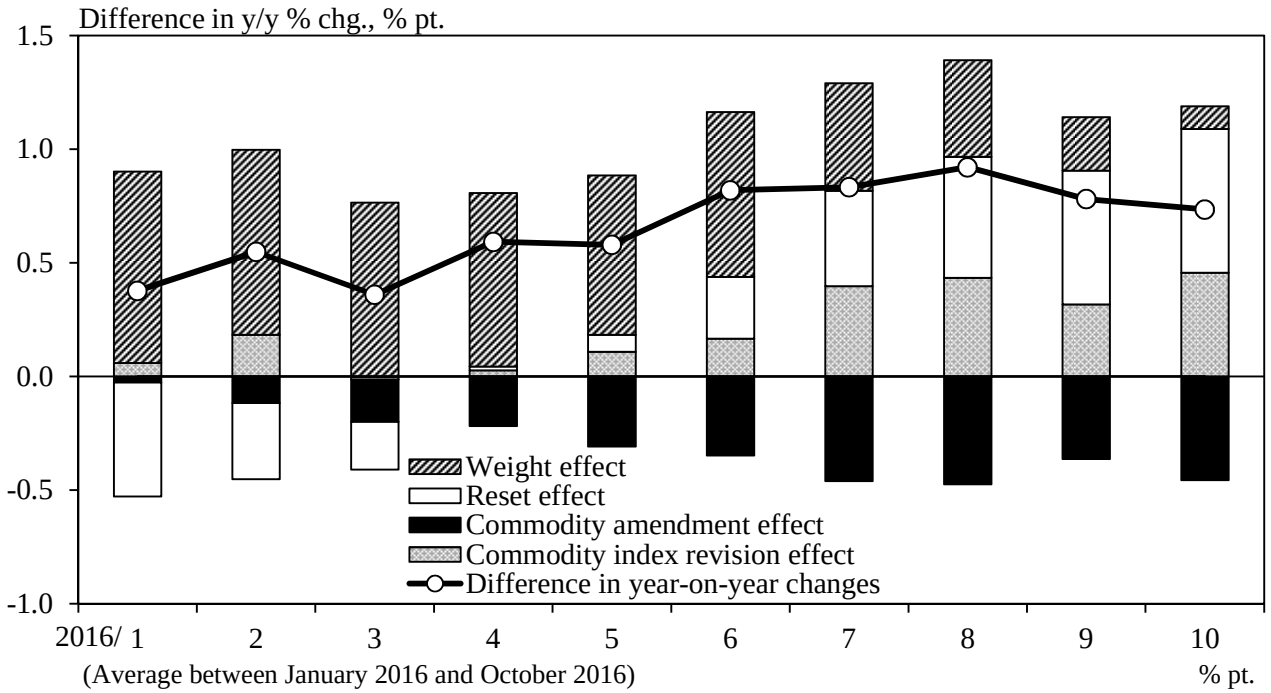


(2) Year-on-Year Change (All Commodities, Yen Basis)



Decomposition of Difference in Year-on-Year Changes between the Old and New Indexes: Export Price Index

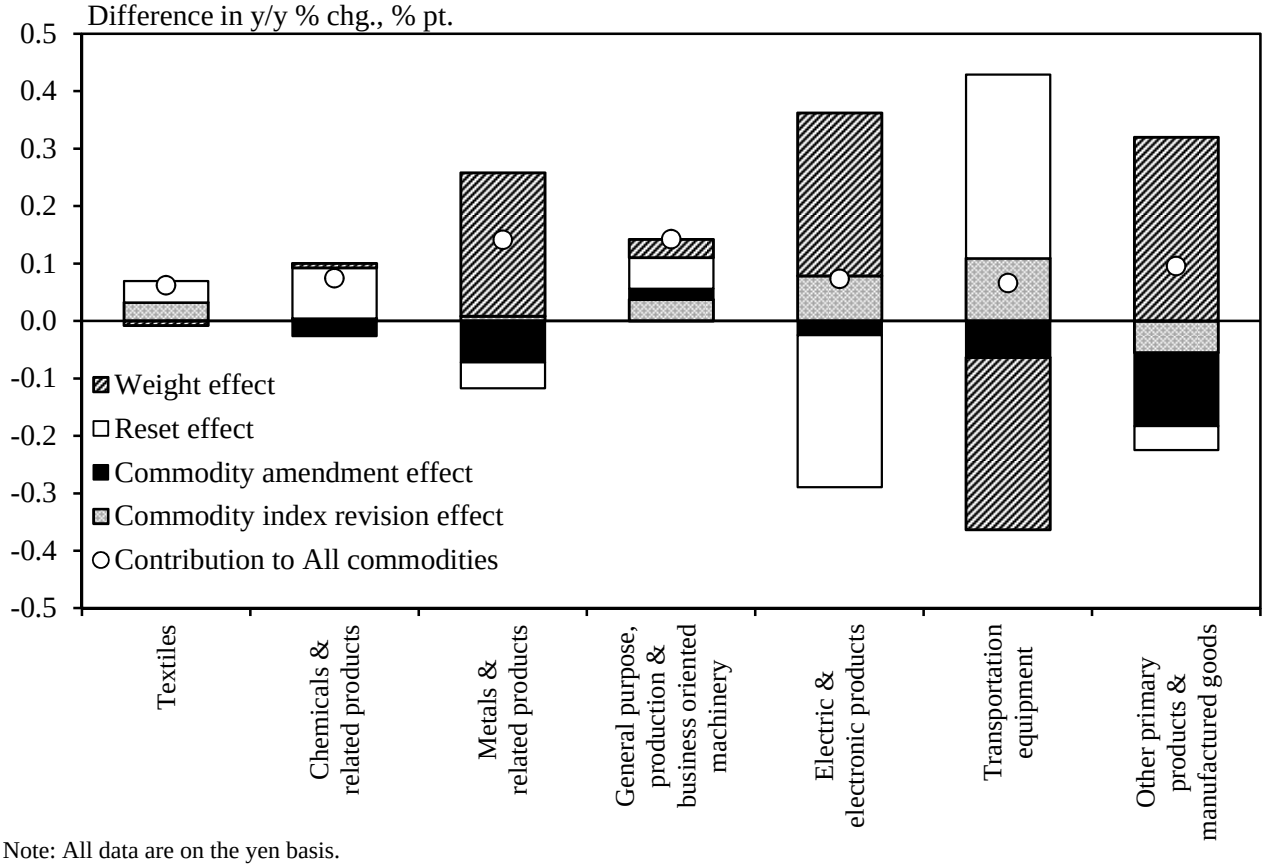
(1) Decomposition of Difference in Year-on-Year Changes (All Commodities)



(Average between January 2016 and October 2016) % pt.

Difference in y/y % chg.	Weight effect	Reset effect	Commodity amendment effect	Commodity index revision effect
plus 0.7	plus 0.58	plus 0.15	minus 0.29	plus 0.22

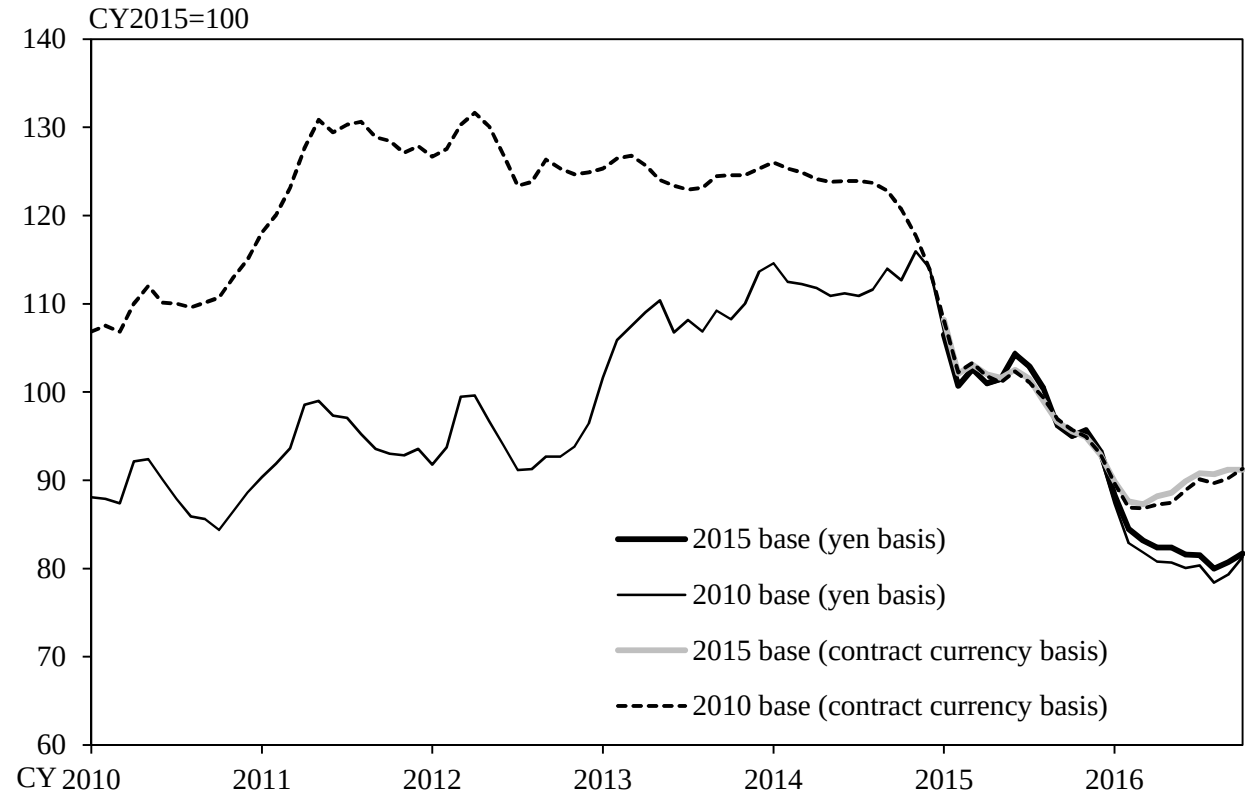
(2) Decomposition by Groups (Average of Every Month from January 2016 to October 2016)



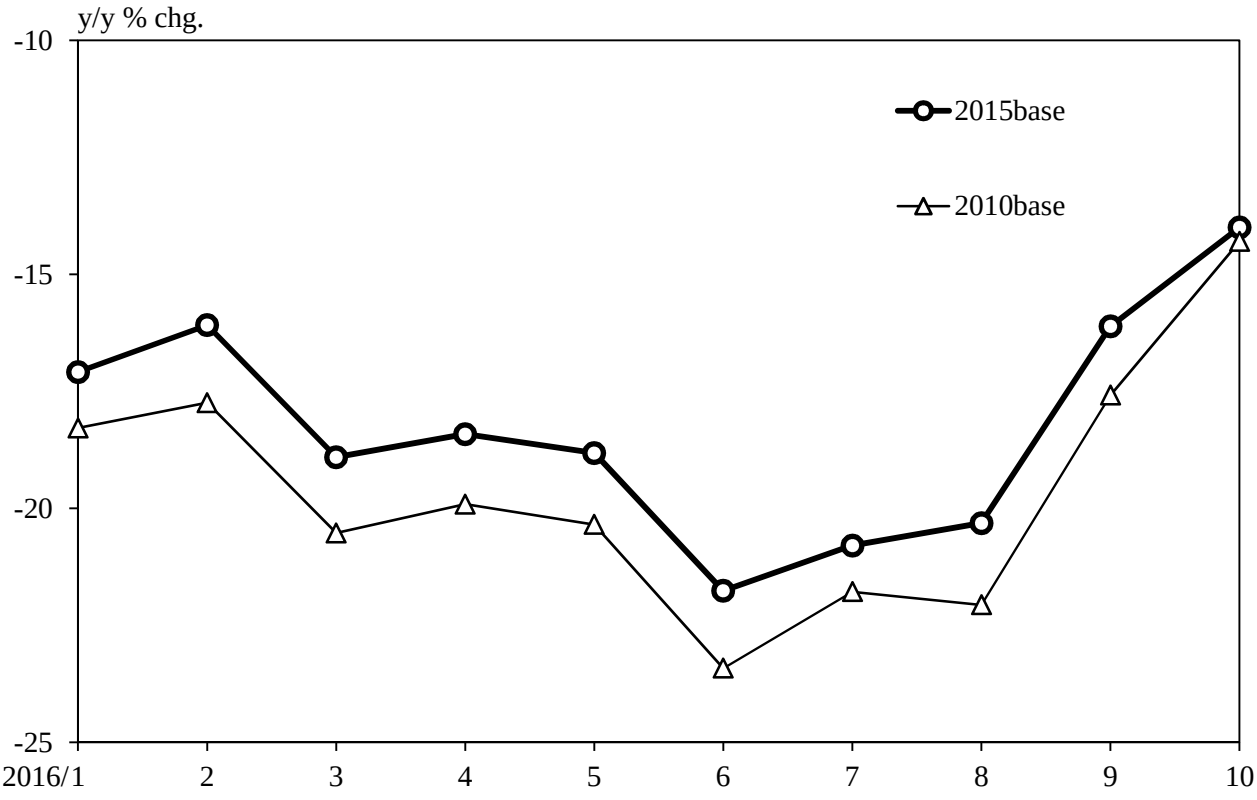
Note: All data are on the yen basis.

Comparison between the Old and New Indexes: Import Price Index

(1) Level (All Commodities)

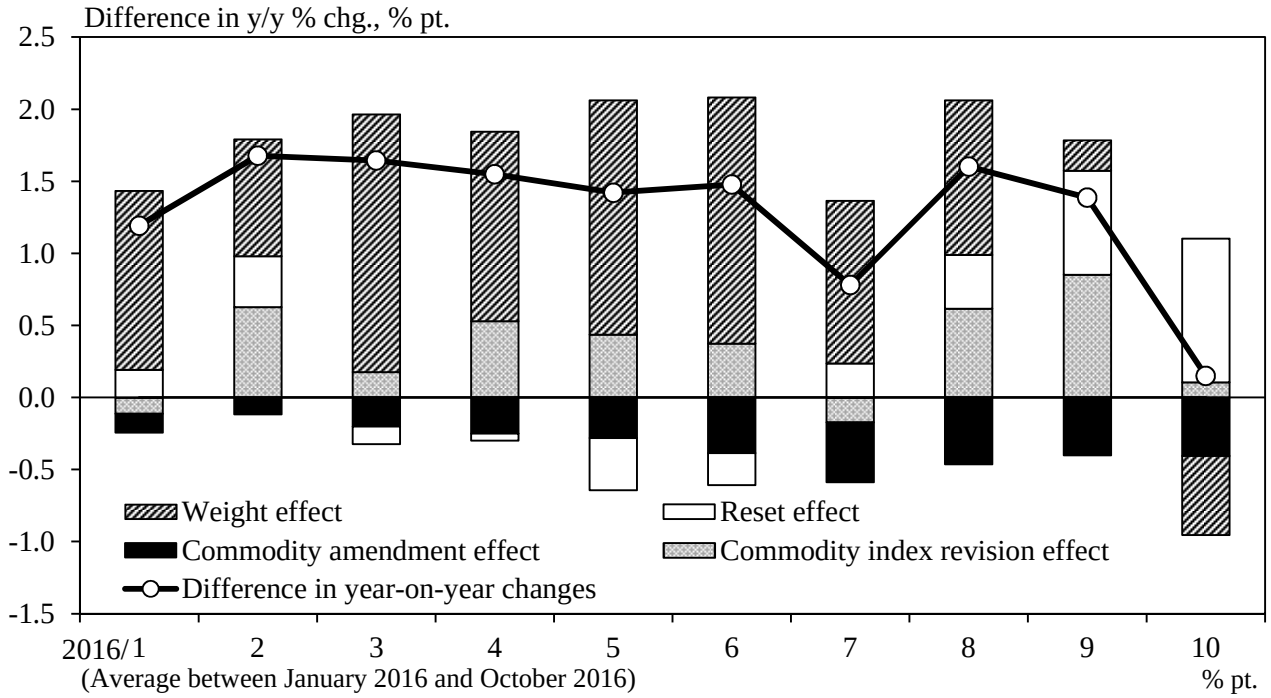


(2) Year-on-Year Change (All Commodities, Yen Basis)



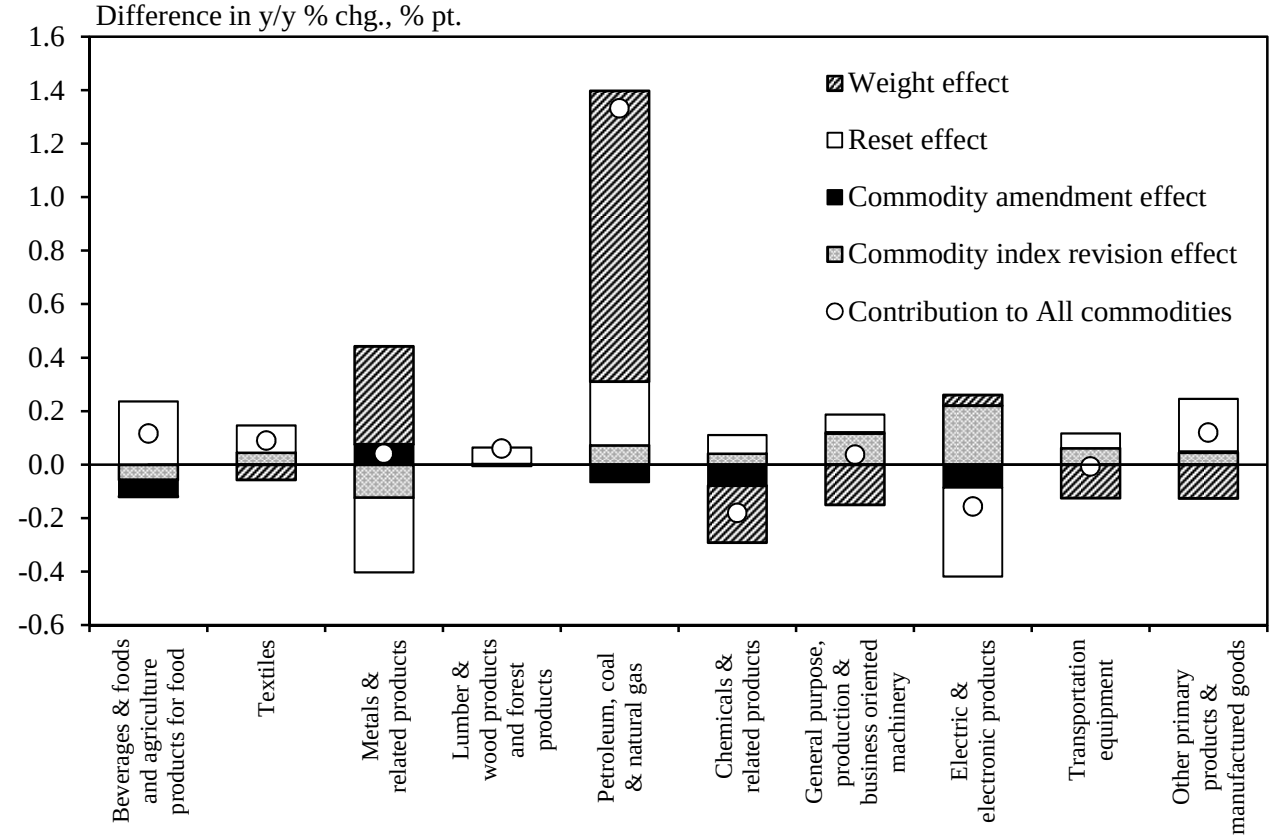
Decomposition of Difference in Year-on-Year Changes between the Old and New Indexes: Import Price Index

(1) Decomposition of Difference in Year-on-Year Changes (All Commodities)



Difference in y/y % chg.	Weight effect	Reset effect	Commodity amendment effect	Commodity index revision effect
plus 1.4	plus 1.04	plus 0.21	minus 0.30	plus 0.34

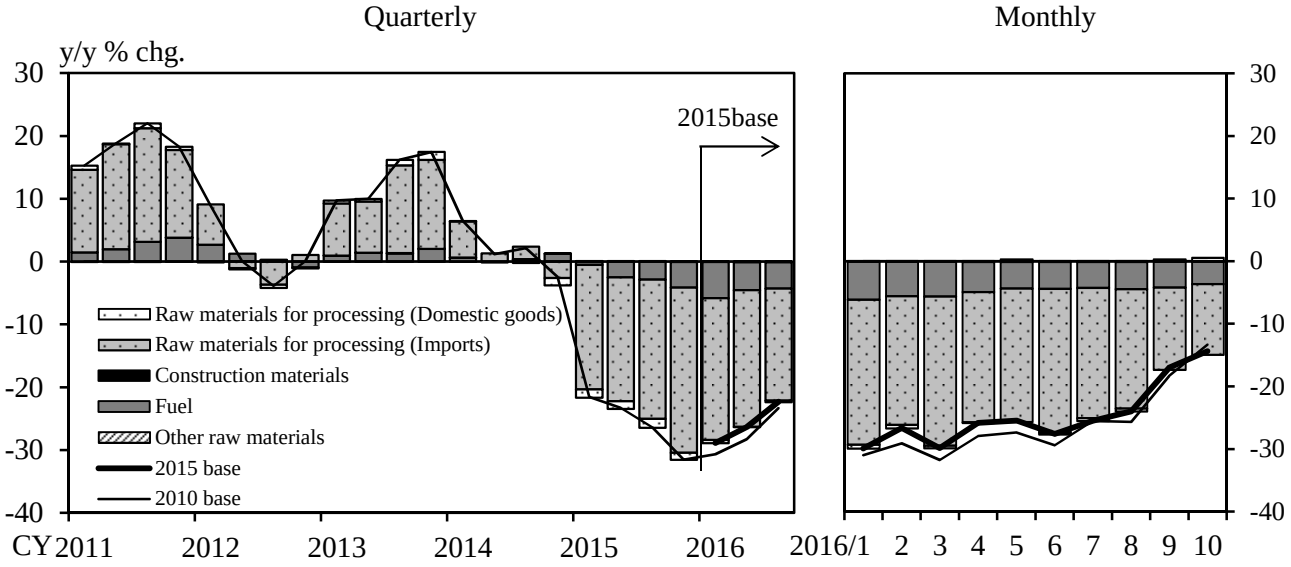
(2) Decomposition by Groups (Average of Every Month from January 2016 to October 2016)



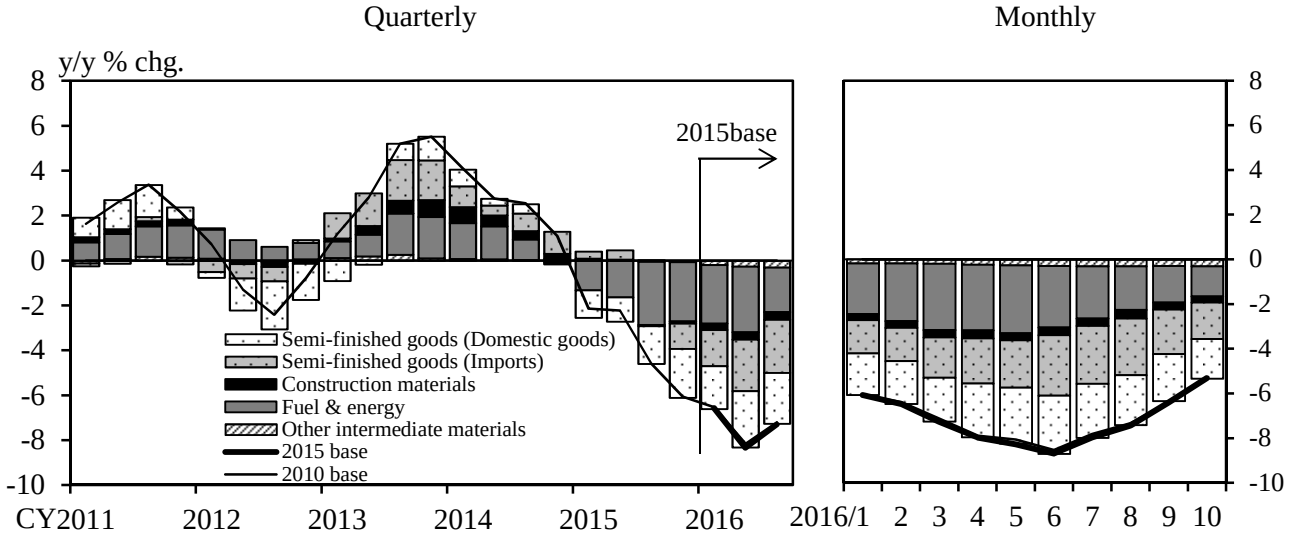
Note: All data are on the yen basis.

Index by Stage of Demand and Use: Comparison between the Old and New Indexes

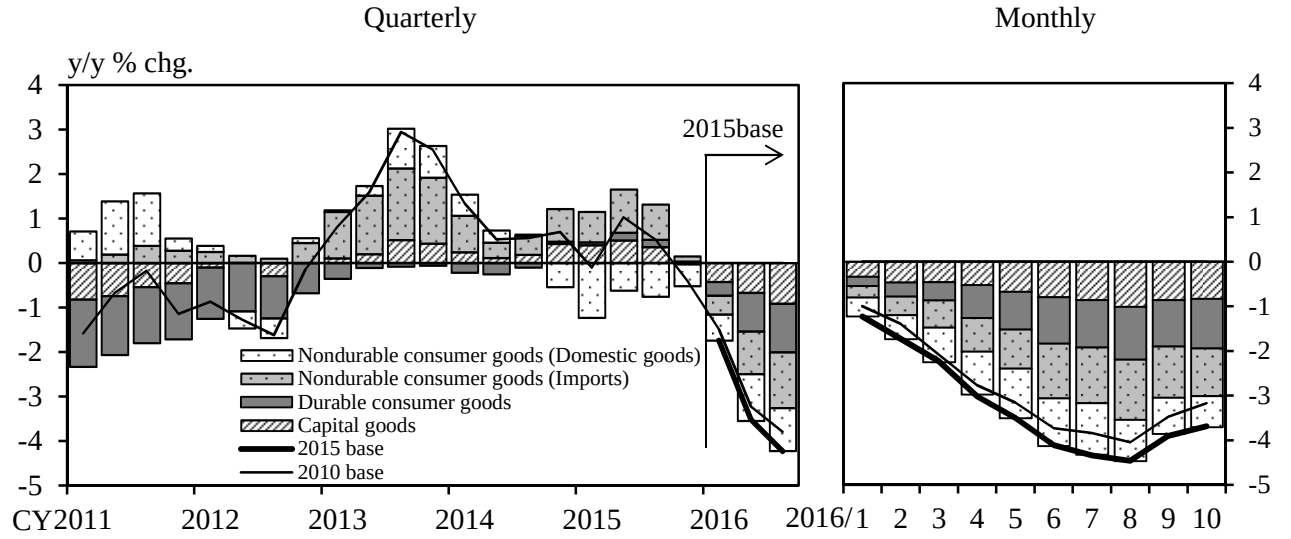
(1) Raw Materials



(2) Intermediate Materials

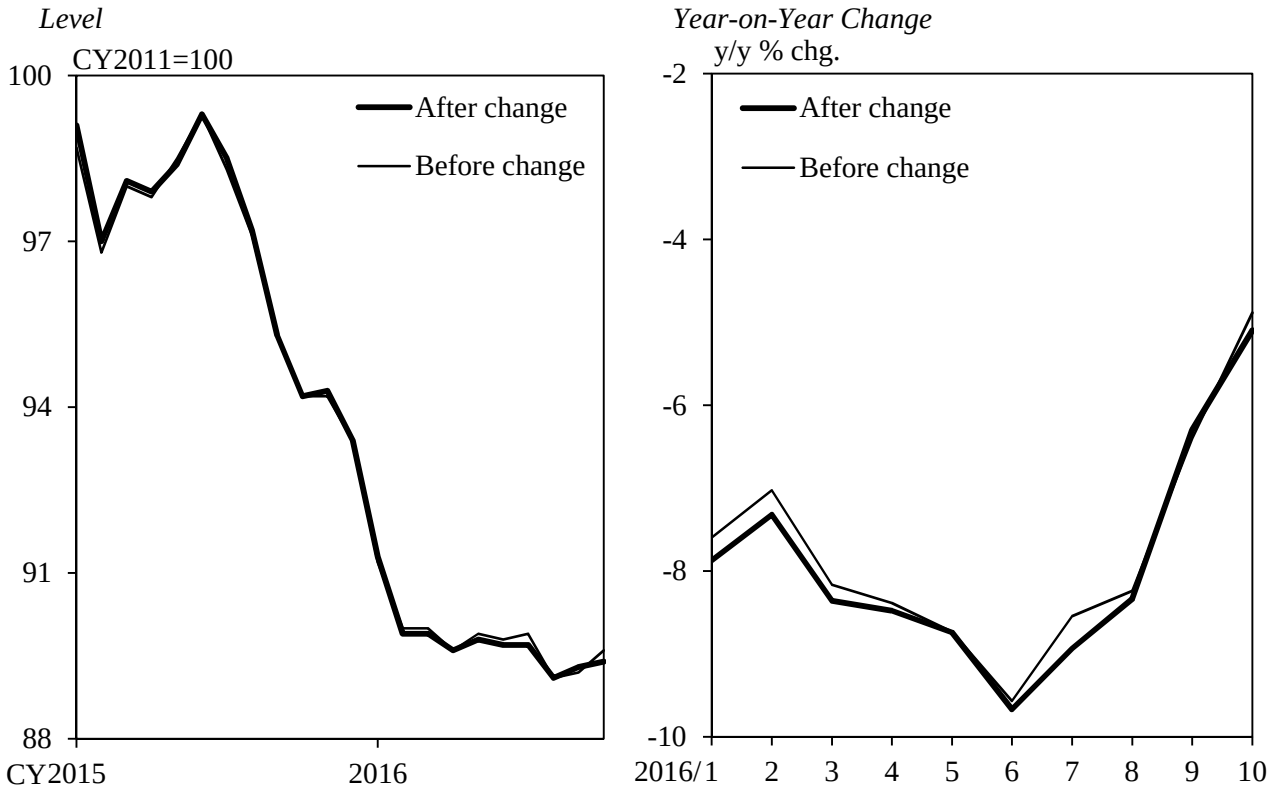


(3) Final Goods

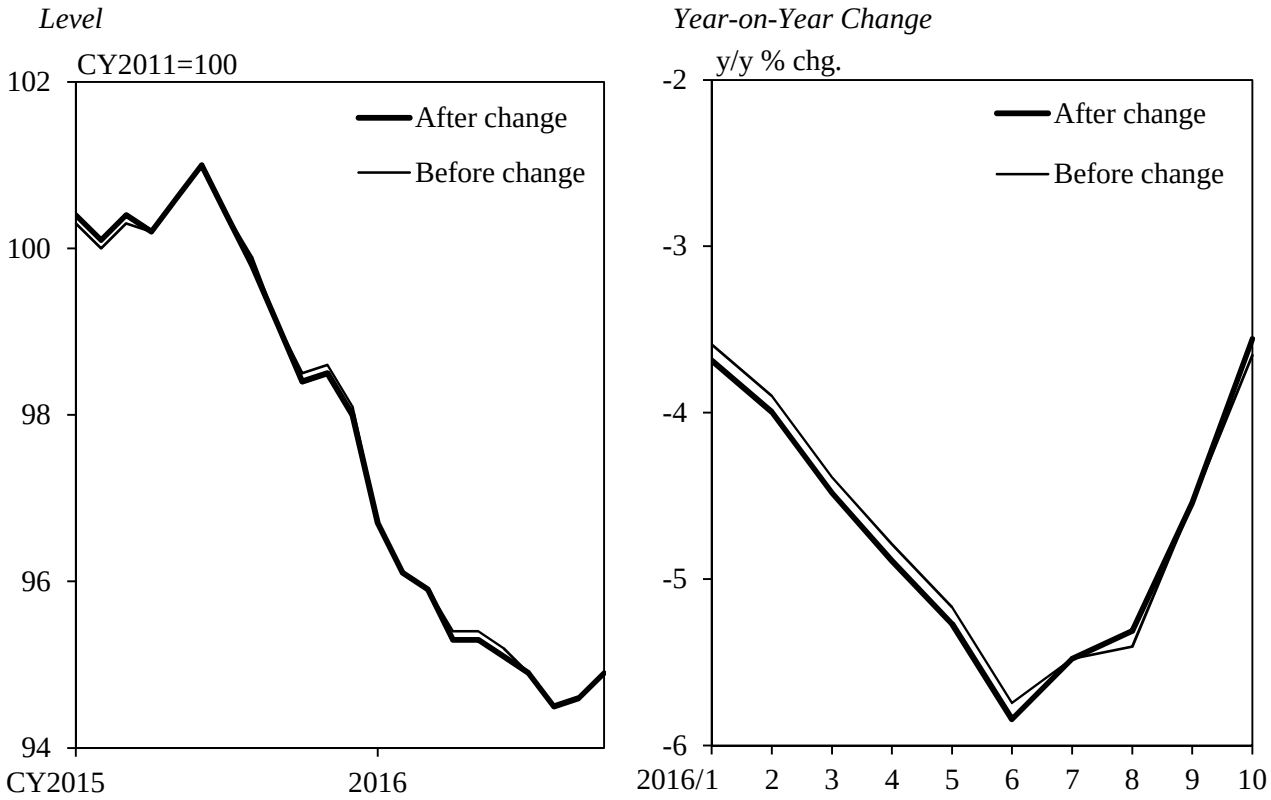


Input-Output Price Index of the Manufacturing Industry by Sector: Comparison between the Old and New Indexes

(1) Input Price Index (Manufacturing Industry)



(2) Output Price Index (Manufacturing Industry)



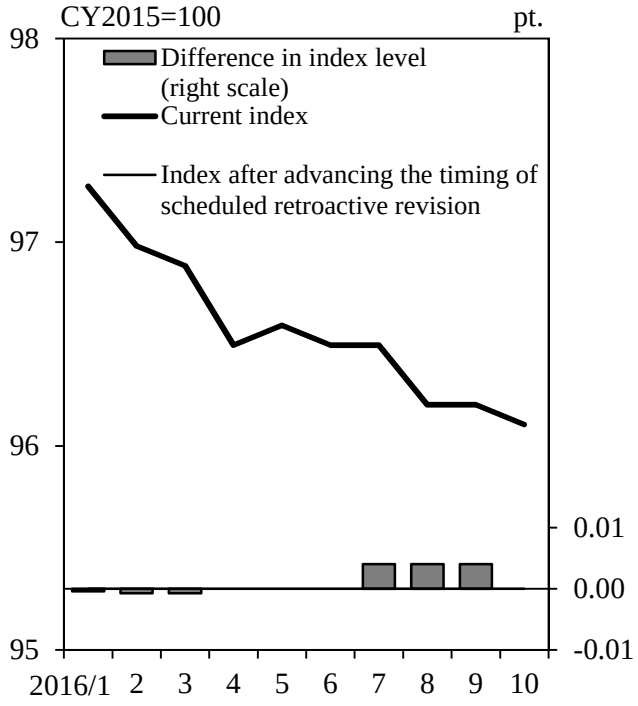
Effect of Advancing the Timing of Scheduled Retroactive Revisions

(1) Changes in Scheduled Retroactive Revisions and its Effect

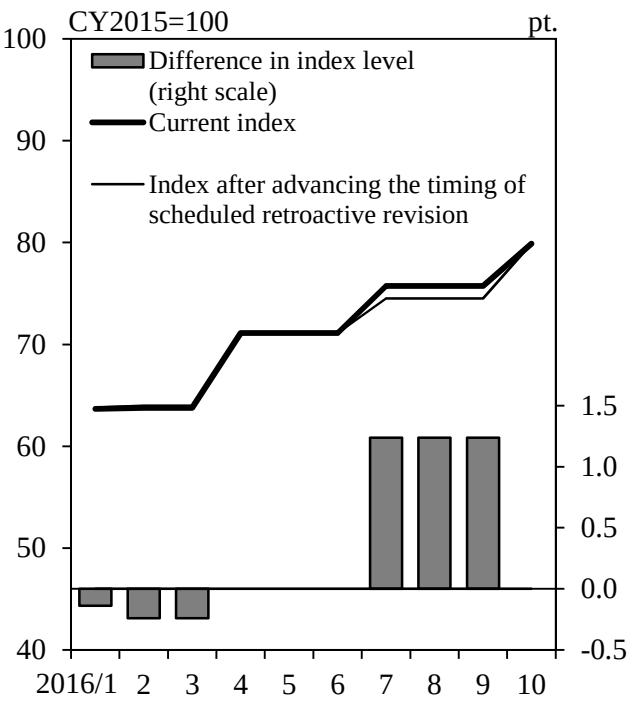
Groups	Main commodities	Survey month	Months of collecting finalized prices	Months of reflecting retroactive revision		Effect	Weights
				2010 base	2015 base		
Chemicals & related products	Ethylene, Propylene, Xylene, etc.	January-March	May	October	September	No	8.4
		April-June	August	October	September	No	
		July-September	November	April	March	No	
		October-December	February	April	March	No	
Petroleum & coal products	Naphtha	January-March	June	October	September	No	3.1
		April-June	September	October	September	No	
		July-September	December	April	March	No	
		October-December	March	April	March	No	
	Fuel oil C	January-March	April	April	September	Yes	3.3
		April-June	July	October	September	No	
		July-September	October	October	March	Yes	
		October-December	January	April	March	No	
Iron & steel	Hot rolled steel strips, Hot-dip zinc-coated steel sheets, etc.	January-March	May	October	September	No	11.4
		April-June	August	October	September	No	
		July-September	November	April	March	No	
		October-December	February	April	March	No	

(2) Effect of Advancing the Timing of Scheduled Retroactive Revisions

All commodities of PPI



"Fuel oil C"

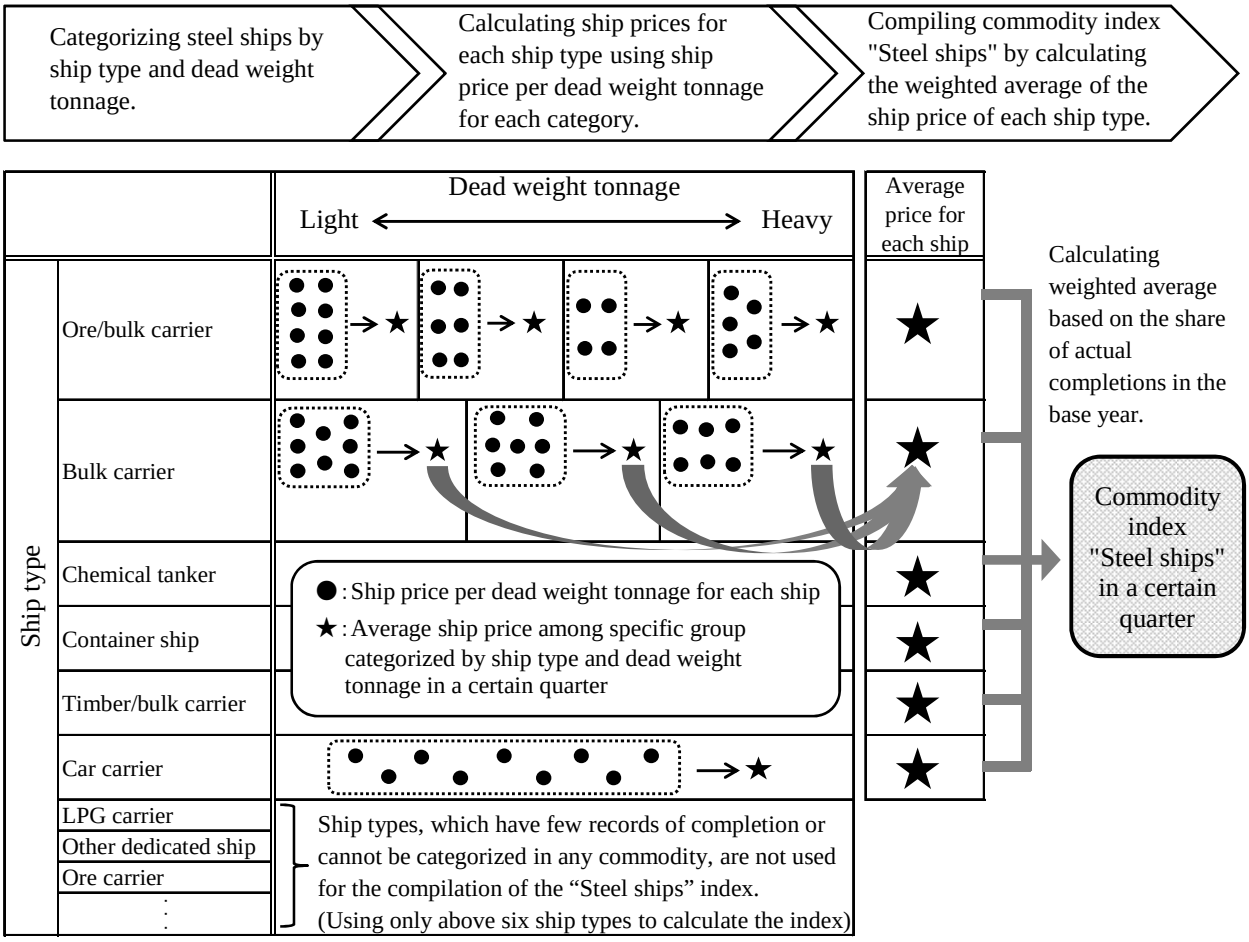


Notes: 1. All data are PPI. Collection of finalized prices may be delayed, depending on the progress in companies' price negotiations, for some sample prices of "Naphtha" and tied sales prices of commodities in group "Iron & steel".

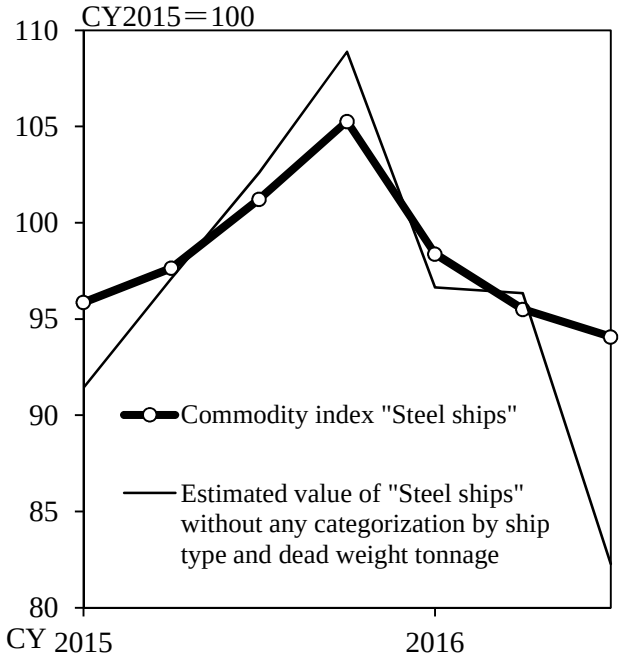
2. The weight of group "Chemicals & related products" in (1) is sum of those of "Ethylene," "Propylene," "Butane & butylene," "Toluene," "Xylene," "Acrylonitrile," "Vinyl acetate monomer," and "Bisphenol A". The weight of group "Iron &steel" in (1) is sum of those of "Hot rolled steel strips," "Cold rolled steel strips," "Cold rolled electrical steel hoops," "Hot-dip zinc-coated steel sheets," "Bearing steel," and "High tensile strength steel."

Index Compilation Method for "Steel ships" in the Export Price Index

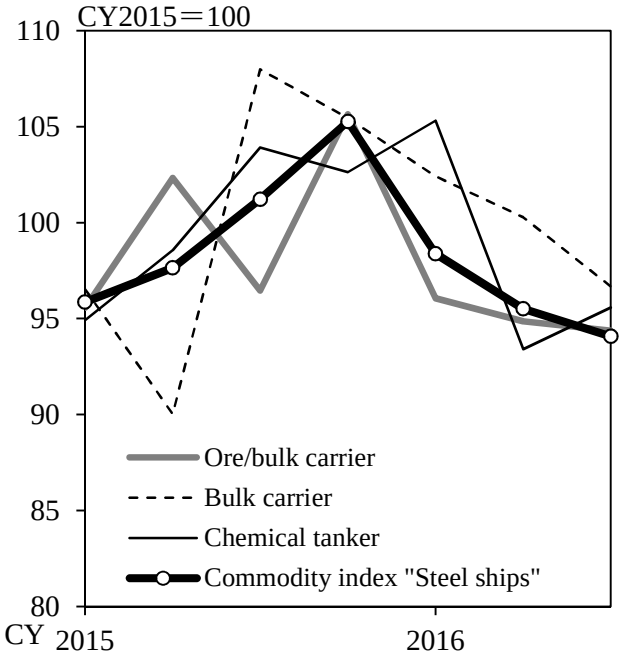
(1) Index Compilation Method



(2) Restraint on Noises by Categorization



(3) Indexes for "Steel ships" and Others



Note: Estimated value of "Steel ships" in (2) represents simple average of all ship prices without any categorization.
Sources: Ministry of Land, Infrastructure, Transport and Tourism "Shipbuilding Statistics."

Results of Paasche Check

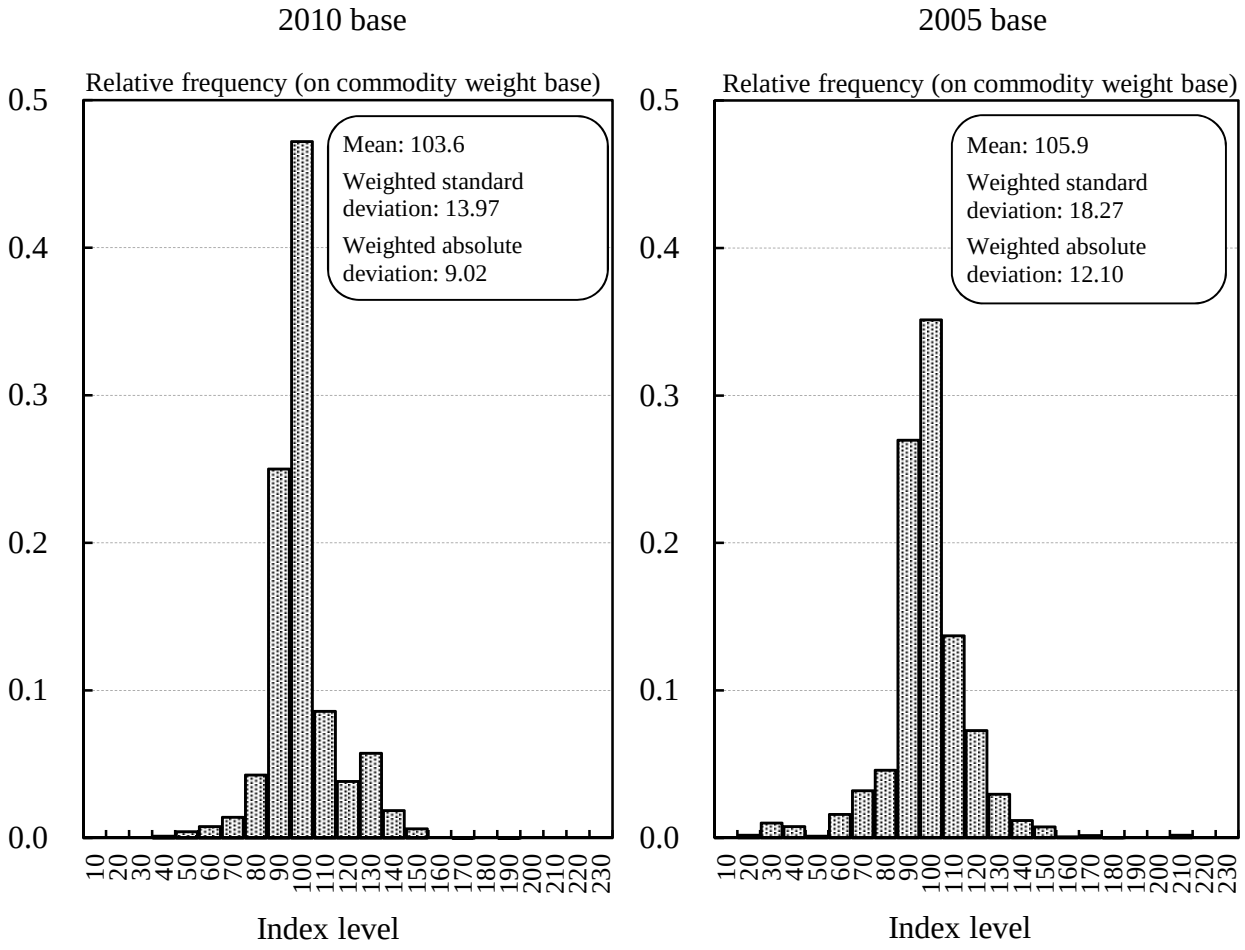
(1) Difference of Rates between the Paasche Index and the Laspeyres Index

(Paasche index - Laspeyres index with fixed weights) / Laspeyres index with fixed weights * 100

%

year	Base year for weight calculation of fix-weighted Laspeyres index	Base year for weight calculation of Paasche index	Producer Price Index	Export Price Index	Import Price Index
1995	1990	1995	minus 1.2	minus 8.1	minus 5.3
2000	1995	2000	minus 3.5	minus 3.1	minus 5.3
2005	2000	2005	minus 4.2	minus 5.4	minus 9.9
2010	2005	2010	minus 3.6	minus 1.7	minus 5.1
2015	2010	2015	minus 0.04	minus 1.5	minus 3.1

(2) Dispersion of Commodity Index Levels (Producer Price Index)



Notes: 1. Paasche index is calculated by applying the 2015 base weights to the 2010 base commodity indexes. It is calculated using simplified methods, such as: (1) Deleted commodities in the 2015 base index are given 0 weight and not included in the calculation of the Paasche index; (2) the 2015 base weights are consolidated for split (consolidated) commodities in the 2015 base index (split using the ratios of 2010 weights) so that the scope of commodities is consistent with that of the 2010 base; (3) the 2015 base weights are directly used for expanded, declined, and relabelled commodities.

2. The figures for the EPI and IPI in (1) are on the yen basis.

Expansion of the Scope for Application of Hedonic Regression Method

(1) Passenger cars

Scope of application		**(For PPI)** Commodity class "Passenger cars," excluding "Mini passenger cars" and "Passenger cars (clean energy vehicles)." **(For EPI and IPI)** Commodity class "Passenger cars," excluding clean energy vehicles of which "Mini passenger cars" and "Passenger cars (clean energy vehicles)." *Regression models for five types of sedans & station wagons, minivans, SUVs, hatchbacks, and hybrid vehicles are estimated, respectively. *The same models are applied to all products.
Data set	source	・Price and specification data are provided with the *Goo-net* by the PROTO CORPORATION. ・The average discount rates are provided with *Monthly Car Magazine JIKAYOSHA* by the Naigai Publishing Corp.
	price characteristics	Retail prices obtained by multiplying the suggested retail prices and the average discount rates.
	number of observations	2,378 (from 3rd Quarter 2013 to 2nd Quarter 2015) 1,489 (form 3rd Quarter 2014 to 2nd Quarter 2016)
Frequency of estimation		Every October

(2) Smartphones

Scope of application		**(For PPI and IPI)** Smartphones of which "Cellular phones." **(For EPI)** Smartphones of which "Fixed & mobile radio communications equipment." *The same model is applied to all products.
Data set	source	・Price data are provided with websites of Mobile Network Operators. ・Specification data are provided with the *BCN Ranking* and brochures of each manufacture.
	price characteristics	・Cash sales prices for new subscription.
	number of observations	78 (from 4Q 2014 to 3Q 2015) 96 (from 3Q 2015 to 2Q 2016)
Frequency of estimation		Every March and September

(3) LCD Televisions

Scope of application		**(For PPI and IPI)** LCD Televisions of which "Television receivers." **(For SPPI)** Rental LCD Televisions of which "Communications & office equipment and machinery & equipment rental for service industries." *The same model is applied to all products.
Data set	source	・Price data are provided with *BCN Ranking* by the BCN Inc. ・Specification data are provided with the *BCN Ranking* and brochures of each manufacture.
	price characteristics	・Retail prices at the electronics retail stores.
	number of observations	133 (from 4Q 2014 to 3Q 2015)
Frequency of estimation		Every April

Note: Hedonic regression model is assumed to be the general functional form expressed as follows:

$$\frac{y^{\lambda_0}-1}{\lambda_0} = \beta_0 + \sum_{i=1}^{n} \beta_i \frac{x_i^{\lambda_i}-1}{\lambda_i} + u$$

where λ is the Box-Cox transformation parameter

When λ =0, function is logarithmic; When λ=1, function is linear. The functional form is determined by Box-Cox test (likelihood ratio test) under constraints of each parameter settings, such as in the Double Box-Cox Model, Semi Box-Cox Model (when λ_i=1), Log-Linear Model (when $\lambda_0=\lambda_i$=0), Semi Log-Linear Model (when λ_0=0, λ_i=1), and Linear Model (when $\lambda_0=\lambda_i$=1).

Results of Hedonic Regressions for Passenger Cars (Sedans & Station Wagons)

Suggested period of application	First Time Estimation January 2015-November 2016	Second Time Estimation December 2016-
Estimated Model	Double Box-Cox Model	Log-Linear Model
Box-Cox Parameter of Dependent Variable	0.242	--
Intercept	-8.850E+06 ***	10.076 ***
Horsepower (PS)	13.904 ***	0.557 ***
Box-Cox Parameter	0.092	--
Fuel Efficiency JC08 (km/l)×Curb weight (kg)	1.306E+07 ***	0.146 *
Box-Cox Parameter	-1.475	--
Dummy Variables		
Number of Cylinders		
6 Cylinders (6 and more for the 2nd time)	6.655 ***	0.113 ***
8 Cylinders	17.613 ***	--
Intake System		
Turbocharger	2.241 **	0.154 ***
Powertrain		
FR	--	0.091 ***
AWD (Full time or Part time)	1.965 ***	0.113 ***
Transmission		
CVT	-2.507 ***	--
Standard Equipment		
Air Conditioning	3.087 ***	0.113 ***
Dual Air Conditioning	7.505 ***	0.229 ***
Cruise Control	2.659 ***	0.083 ***
Front Power Seats	--	0.068 ***
Rear Power Seats	10.168 ***	0.318 ***
Side Airbags	1.066 *	--
Crash Safety Body	3.498 ***	--
LSD (Limited Slip Differential)	--	0.145 ***
Leather Steering	--	0.039 **
Brand		
Brand A	18.120 ***	0.188 ***
Brand B	23.049 ***	0.348 ***
Brand C	15.877 ***	0.421 ***
Brand D	--	-0.246 ***
Brand E	--	-0.235 ***
Period		
(1st time) 4Q 2013 / (2nd time) 4Q 2014	1.015	0.054 ***
(1st time) 1Q 2014 / (2nd time) 1Q 2015	5.265 ***	0.082 **
(1st time) 2Q 2014 / (2nd time) 2Q 2015	0.422	-0.005
(1st time) 3Q 2014 / (2nd time) 3Q 2015	0.496	0.065 **
(1st time) 4Q 2014 / (2nd time) 4Q 2015	2.930 ***	0.132 ***
(1st time) 1Q 2015 / (2nd time) 1Q 2016	3.462 **	0.091
(1st time) 2Q 2015 / (2nd time) 2Q 2016	0.476	0.048 ***
R^2	0.973	0.975
Adjusted R^2	0.972	0.972
Standard Error of Regression	3.723	0.089
Mean of Dependent Variable	152.939	14.961
Number of Observations	560	295
(release dates)	(from 3Q 2013 to 2Q 2015)	(from 3Q 2014 to 2Q 2016)
Tests for Double Box-Cox Model (H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	34.837 ***	24.877 ***
H_0: Log-Linear (λ_0=λ_i=0)	21.205 ***	3.310
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	90.613 ***	28.001 ***
H_0: Linear (λ_0=λ_i=1)	214.352 ***	183.421 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox/Log-Linear Models are determined based on the result of likelihood ratio test. The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for Passenger Cars (Minivans)

Suggested period of application	First Time Estimation January 2015-November 2016	Second Time Estimation December 2016-
Estimated Model	Double Box-Cox Model	Double Box-Cox Model
Box-Cox Parameter of Dependent Variable	-0.595	-0.534
Intercept	-12.798 **	1.831 ***
Horsepower (PS)	1.234 ***	0.045 ***
Box-Cox Parameter	-1.991	-1.078
Room Space (m^3)	1.327E-06 ***	1.130E-08 ***
Box-Cox Parameter	2.209	4.665
Fuel Efficiency JC08 (km/l)×Curb weight (kg)	19.659 **	2.117E-09 ***
Box-Cox Parameter	-1.419	0.321
Dummy Variables		
Number of Cylinders		
6 Cylinders	1.287E-05 ***	--
Powertrain		
AWD (Full time or Part time)	1.391E-05 ***	3.277E-05 ***
Standard Equipment		
LSD (Limited Slip Differential)	2.236E-05 ***	8.927E-05 ***
Front Fog Lamps	6.145E-06 ***	--
Dual Air Conditioning	2.394E-05 ***	6.904E-05 ***
Cruise Control	5.547E-06 ***	2.041E-05 ***
Leather Steering	6.329E-06 ***	1.590E-05 ***
Front Power Seats	1.957E-05 ***	4.364E-05 ***
Side Airbags	4.875E-06 ***	--
Alloy Wheels	1.439E-05 ***	3.272E-05 ***
Brand		
Brand A	-5.088E-06 **	--
Brand B	--	-3.702E-05 ***
Brand C	--	-2.903E-05 ***
Period		
(1st time) 4Q 2013 / (2nd time) 4Q 2014	6.215E-06	7.528E-06
(1st time) 1Q 2014 / (2nd time) 1Q 2015	1.129E-05 **	5.833E-05 ***
(1st time) 2Q 2014 / (2nd time) 2Q 2015	8.574E-06 *	7.653E-06
(1st time) 3Q 2014 / (2nd time) 3Q 2015	1.060E-05 **	1.776E-05 ***
(1st time) 4Q 2014 / (2nd time) 4Q 2015	2.802E-06	--
(1st time) 1Q 2015 / (2nd time) 1Q 2016	1.910E-05 ***	3.823E-06
(1st time) 2Q 2015 / (2nd time) 2Q 2016	8.481E-06 *	3.270E-05 ***
R^2	0.963	0.956
Adjusted R^2	0.962	0.954
Standard Error of Regression	1.197E-05	2.788E-05
Mean of Dependent Variable	1.681	1.873
Number of Observations	805	450
(release dates)	(from 3Q 2013 to 2Q 2015)	(from 3Q 2014 to 2Q 2016)
Tests for Double Box-Cox Model		
(H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	56.699 ***	75.777 ***
H_0: Log-Linear (λ_0=λ_i=0)	177.369 ***	354.856 ***
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	173.462 ***	92.557 ***
H_0: Linear (λ_0=λ_i=1)	892.692 ***	425.986 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox Model is determined based on the result of likelihood ratio test.
The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for Passenger Cars (SUVs)

Suggested period of application	First Time Estimation January 2015-November 2016	Second Time Estimation December 2016-
Estimated Model	Double Box-Cox Model	Double Box-Cox Model
Box-Cox Parameter of Dependent Variable	0.155	-0.568
Intercept	-3.149E+06 ***	-43.960 *
Horsepower (PS)	12,165.064 ***	0.001 ***
Box-Cox Parameter	-1.582	-0.561
Fuel Efficiency JC08 (km/l)×Curb weight (kg)	4.632E+06 ***	66.200 *
Box-Cox Parameter	-1.475	-1.448
Dummy Variables		
Number of Cylinders		
6 Cylinders (6 and more for the 2nd time)	1.305 ***	8.033E-05 ***
8 Cylinders	2.372 ***	--
Powertrain		
AWD (Full time or Part time)	--	2.001E-05 ***
Transmission		
CVT	-0.851 ***	--
Standard Equipment		
LSD (Limited Slip Differential)	0.568 ***	--
Alloy Wheels	0.505 ***	1.409E-05 **
Dual Air Conditioning	1.797 ***	--
Front Power Seats	1.660 ***	1.355E-05 **
Side Airbags	1.767 ***	3.834E-05 ***
Front Fog Lamps	--	1.905E-05 ***
Brand		
Brand A	3.314 ***	9.239E-05 ***
Brand B	-0.721 ***	-2.653E-05 ***
Brand C	-3.211 ***	-5.115E-05 ***
Brand D	2.640 ***	7.235E-05 ***
Period		
(1st time) 4Q 2013 / (2nd time) 4Q 2014	-0.236	3.262E-05 ***
(1st time) 1Q 2014 / (2nd time) 1Q 2015	--	4.492E-05 ***
(1st time) 2Q 2014 / (2nd time) 2Q 2015	-0.385 *	4.202E-05 ***
(1st time) 3Q 2014 / (2nd time) 3Q 2015	-0.582 *	3.660E-05 ***
(1st time) 4Q 2014 / (2nd time) 4Q 2015	0.025	1.238E-05 *
(1st time) 1Q 2015 / (2nd time) 1Q 2016	0.399	-1.682E-06
(1st time) 2Q 2015 / (2nd time) 2Q 2016	0.145	--
R^2	0.924	0.939
Adjusted R^2	0.916	0.928
Standard Error of Regression	0.884	1.562E-05
Mean of Dependent Variable	57.258	1.759
Number of Observations	230	122
(release dates)	(from 3Q 2013 to 2Q 2015)	(from 3Q 2014 to 2Q 2016)
Tests for Double Box-Cox Model		
(H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	34.471 ***	5.246 *
H_0: Log-Linear (λ_0=λ_i=0)	15.873 ***	63.569 ***
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	38.198 ***	13.471 ***
H_0: Linear (λ_0=λ_i=1)	65.381 ***	60.762 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox Model is determined based on the result of likelihood ratio test.
The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for Passenger Cars (Hatchbacks)

Suggested period of application	First Time Estimation January 2015-November 2016	Second Time Estimation December 2016-
Estimated Model	Double Box-Cox Model	Log-Linear Model
Box-Cox Parameter of Dependent Variable	0.097	--
Intercept	-434.477 *	9.827 ***
Horsepower (PS)	0.130 ***	0.438 ***
Box-Cox Parameter	0.561	--
Fuel Efficiency JC08 (km/l)×Curb weight (kg)	319.462 *	0.213 ***
Box-Cox Parameter	-0.692	--
Dummy Variables		
Intake System		
Supercharger	0.186 **	--
Powertrain		
AWD (Full time or Part time)	0.506 ***	0.139 ***
Transmission		
7 and more Gears	0.548 ***	0.100 **
Standard Equipment		
Air Conditioning	0.118 ***	0.047 ***
Leather Steering	0.443 ***	0.137 ***
Front Power Seats	0.220 ***	0.057 **
Side Airbags	0.229 ***	0.034 **
Traction Control	0.343 ***	0.058 ***
Brand		
Brand A	1.472 ***	0.424 ***
Brand B	1.189 ***	0.265 ***
Brand C	2.180 ***	0.546 ***
Period		
(1st time) 4Q 2013 / (2nd time) 4Q 2014	0.076	-0.046 **
(1st time) 1Q 2014 / (2nd time) 1Q 2015	--	0.033
(1st time) 2Q 2014 / (2nd time) 2Q 2015	0.101	0.012
(1st time) 3Q 2014 / (2nd time) 3Q 2015	0.164 *	-0.009
(1st time) 4Q 2014 / (2nd time) 4Q 2015	0.039	-0.135 ***
(1st time) 1Q 2015 / (2nd time) 1Q 2016	0.228	-0.034 *
(1st time) 2Q 2015 / (2nd time) 2Q 2016	0.276 ***	0.006
R^2	0.964	0.948
Adjusted R^2	0.962	0.945
Standard Error of Regression	0.304	0.075
Mean of Dependent Variable	31.027	14.255
Number of Observations	365	321
(release dates)	(from 3Q 2013 to 2Q 2015)	(from 3Q 2014 to 2Q 2016)
Tests for Double Box-Cox Model (H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	12.449 ***	11.650 ***
H_0: Log-Linear (λ_0=λ_i=0)	15.938 ***	6.223
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	39.281 ***	25.733 ***
H_0: Linear (λ_0=λ_i=1)	416.568 ***	176.744 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox/Log-Linear Models are determined based on the result of likelihood ratio test. The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for Passenger Cars (Hybrid Vehicles)

Suggested period of application	First Time Estimation January 2015-November 2016	Second Time Estimation December 2016-
Estimated Model	Double Box-Cox Model	Double Box-Cox Model
Box-Cox Parameter of Dependent Variable	0.240	0.174
Intercept	-3.481E+07 ***	-3,276.491 ***
Horsepower (PS)	5.854 ***	0.264 ***
Box-Cox Parameter	0.255	0.701
Fuel Efficiency JC08 (km/l)×Curb weight (kg)	4.848E+07 ***	1,612.781 ***
Box-Cox Parameter	-1.393	-0.481
Dummy Variables		
Car Configuration		
Minivans	4.738 ***	2.831 ***
SUVs	2.246 **	1.523 ***
Sedans & Station Wagons	2.076 **	--
Number of Cylinders		
8 Cylinders	19.668 ***	--
Powertrain		
FR	5.840 ***	2.006 ***
AWD (Full time or Part time)	4.268 ***	1.321 ***
Standard Equipment		
LSD (Limited Slip Differential)	5.452 ***	3.683 ***
Dual Air Conditioning	2.320 **	1.004 ***
Cruise Control	4.456 ***	1.234 ***
Rear Power Seats	8.725 ***	2.961 ***
Side Airbags	1.769 **	--
Brand		
Brand A	11.288 ***	4.009 ***
Brand B	-6.002 ***	--
Brand C	-5.882 ***	--
Brand D	14.159 ***	7.024 ***
Brand E	-1.773 *	--
Period		
(1st time) 4Q 2013 / (2nd time) 4Q 2014	-0.603	-1.847 ***
(1st time) 1Q 2014 / (2nd time) 1Q 2015	0.820	0.362
(1st time) 2Q 2014 / (2nd time) 2Q 2015	0.102	0.934 *
(1st time) 3Q 2014 / (2nd time) 3Q 2015	0.770	-2.284 ***
(1st time) 4Q 2014 / (2nd time) 4Q 2015	-1.633 **	-0.822 *
(1st time) 1Q 2015 / (2nd time) 1Q 2016	3.399 ***	-1.795 ***
(1st time) 2Q 2015 / (2nd time) 2Q 2016	1.597 *	0.105
R^2	0.971	0.942
Adjusted R^2	0.969	0.938
Standard Error of Regression	3.448	1.461
Mean of Dependent Variable	149.788	70.915
Number of Observations	418	301
(release dates)	(from 3Q 2013 to 2Q 2015)	(from 3Q 2014 to 2Q 2016)
Tests for Double Box-Cox Model		
(H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	36.074 ***	14.368 ***
H_0: Log-Linear (λ_0=λ_i=0)	24.441 ***	25.677 ***
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	72.507 ***	23.205 ***
H_0: Linear (λ_0=λ_i=1)	194.542 ***	93.199 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox Model is determined based on the result of likelihood ratio test.
The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for Smartphones

Suggested period of application	First Time Estimation January 2015-September 2016	Second Time Estimation October 2016-
Estimated Model	Double Box-Cox Model	Double Box-Cox Model
Box-Cox Parameter of Dependent Variable	0.881	0.581
Intercept	-3.654E+07 ***	-4,179.240 ***
Camera Resolution (Million pixels)	3,514.242 ***	--
Box-Cox Parameter	0.042	
Pixel per inch (ppi)	--	1,666.045 ***
Box-Cox Parameter		-0.290
Storage (GB)	1,640.917 ***	105.350 ***
Box-Cox Parameter	0.127	0.068
Battery Life (hour)	6.708E+07 ***	--
Box-Cox Parameter	-1.837	
Dummy Variables		
Display Size		
5.5 inch and larger	1,102.214 *	--
4.0 inch and smaller	--	-110.483 ***
CPU		
Octa-core	1,723.833 *	--
Qualcomm Snapdragon 820	--	104.635 *
Added Function		
Electronic Money	4,850.547 ***	85.282 *
Fingerprint Authentication	--	59.881 **
SIM Card Included	--	163.114 ***
Brand		
Brand A	3,649.218 **	--
Manufacture		
Manufacture A	14,362.503 ***	159.283 ***
Manufacture B	2,715.565 ***	--
Manufacture C	-2,353.633 *	--
Manufacture D	-4,080.303 **	-135.666 *
Manufacture E	4,722.479 **	--
Manufacture F	--	-152.268 ***
Manufacture G	--	299.310 **
Period		
(1st time) 1Q 2015 / (2nd time) 4Q 2015	1,243.121	-31.510 **
(1st time) 2Q 2015 / (2nd time) 1Q 2016	-745.422	-27.423
(1st time) 3Q 2015 / (2nd time) 2Q 2016	-2,371.564 **	-102.491
R^2	0.940	0.909
Adjusted R^2	0.925	0.893
Standard Error of Regression	2,140.514	95.454
Mean of Dependent Variable	19,073.636	981.478
Number of Observations (release dates)	78 (from 4Q 2014 to 3Q 2015)	96 (from 3Q 2015 to 2Q 2016)
Tests for Double Box-Cox Model (H_1: Double Box-Cox)		
H_0: Semi Box-Cox (λ_i=1)	14.964 ***	12.850 ***
H_0: Log-Linear (λ_0=λ_i=0)	38.650 ***	27.766 ***
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	84.184 ***	50.808 ***
H_0: Linear (λ_0=λ_i=1)	17.522 ***	15.896 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox Model is determined based on the result of likelihood ratio test.
The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.

Results of Hedonic Regressions for LCD Televisions

Suggested period of application	January 2015-
Estimated Model	Double Box-Cox Model
Box-Cox Parameter of Dependent Variable	0.106
Intercept	18.177 ***
Screen Size (inch)	1.353E-03 ***
Box-Cox Parameter	2.187
Dummy Variables	
Display Resolution	
Full HD	0.339 **
4K	1.890 ***
Motion Enhancer	
120 Hz or 240 Hz	0.327 **
Built-in Tuners	
2 Tuners	0.403 ***
3 Tuners	0.701 ***
9 Tuners	1.582 ***
Built-in Speakers	
3 to 5 Speakers	0.366 **
6 speakers and more	0.761 ***
Built-in Recorders	
Blu-ray and HDD	2.176 ***
Only HDD	1.866 ***
Integrated Features	
Smart TV	1.053 ***
Manufacture	
Manufacture A	-0.497 *
Manufacture B	0.559 ***
Manufacture C	1.102 ***
Manufacture D	-0.772 ***
Period	
1Q 2015	-0.564 ***
2Q 2015	-0.382 **
3Q 2015	-0.302 *
R^2	0.978
Adjusted R^2	0.974
Standard Error of Regression	0.472
Mean of Dependent Variable	22.851
Number of Observations	133
(release dates)	(from 4Q 2014 to 3Q 2015)
Tests for Double Box-Cox Model	
(H_1: Double Box-Cox)	
H_0: Semi Box-Cox (λ_i=1)	12.195 ***
H_0: Log-Linear (λ_0=λ_i=0)	58.302 ***
H_0: Semi Log- Linear (λ_0=0,λ_i=1)	12.835 ***
H_0: Linear (λ_0=λ_i=1)	317.627 ***

Notes: 1. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

2. The specification of Double Box-Cox Model is determined based on the result of likelihood ratio test.
The likelihood ratio statistics is distributed as chi-squared with degrees of freedom equal to the number of restraints.