BOJ Reports & Research Papers

May 2016

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Abstract

In this paper, we introduce the Consumption Activity Index (CAI). The CAI uses a variety of sales and supply-side statistics on goods and services as its source statistics and is provided as a measure for capturing short-term consumption activity on both monthly and quarterly bases. The CAI traces movements of consumption in the household side of the economy, much like those in the Annual Report on National Accounts (ARNA) – the most comprehensive statistic representing nationwide consumption activity – but delivers in a more timely fashion. Unlike demand-side statistics, this index shows only small fluctuations emanating from sample rotations, and also exhibits a high correlation with a number of confidence survey measures. Various versions of the CAI are available – nominal and real indexes as well as those both including and excluding inbound consumption – and they are designed to help users according to their analytical needs. Based on the above-mentioned properties, the CAI will contribute to proper assessment of the actual movements of consumption activities in Japan.

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[*] The authors would like to thank Toshitaka Sekine, Masahiro Higo, Takuji Kawamoto and the staff of the Bank of Japan for their helpful comments. The authors are also grateful to Naoko Ozaki and Ko Miura for their collaboration on the construction of the dataset used for the analysis. Any errors or omissions are the responsibility of the authors. The views expressed here are those of the authors and should not be ascribed to the Bank of Japan. The English translation was mostly prepared by Chikako Wakasa.

1. Introduction

Private consumption is an essential component making up roughly 60 percent of total GDP. Therefore, capturing movements of private consumption as quickly and accurately as possible are deemed important for making judgments on business cycles in the macroeconomy. However, a highly precise measure of private consumption that is released in a timely and comprehensive fashion, accompanying only small statistical fluctuations, does not exist so far. One comprehensive indicator released on a monthly basis is the "Family Income and Expenditure Survey (FIES; Ministry of Internal Affairs and Communications <MIC>). It includes samples of surveyed households that are probably biased, as well as shows inconsistent movements in many cases with other consumption-related indicators.[1] In addition, its volatile monthly fluctuations have made it difficult to trace actual private consumption trends. On the other hand, a number of other indicators – namely, goods-related statistics included in the *Current Survey of Commerce* (CSC; Ministry of Economy, Trade and Industry <METI>), services-related statistics included in *Indices of Tertiary Industry Activity* (ITA; METI), along with other sales and supply-side statistics such as some industry surveys – are delivered promptly, with only small statistical fluctuations, and hence useful for tracing the movements of each component. These indicators are not comprehensive, however, in the sense that they capture only a part of the movement in private consumption.

The *Consumption Activity Index* (CAI) introduced in this paper is a comprehensive index capturing movements of private consumption: it is basically constructed by combining the individual index series contained in the CSC (goods) and ITA (services) – both classified as sales and supply-side statistics – with some industry surveys. The CAI, like sales and supply-side statistics such as statistics in CSC and ITA, is released in a timely manner and shows only small monthly fluctuations. It is hence regarded as a useful tool for tracing actual consumption trends. Furthermore, the CAI uses sales and supply-side statistics, many of which are used for estimating the Annual Report on National Accounts (ARNA) – the most precise measure available for private consumption. Therefore, it is expected that the CAI could be more similar to the ARNA in nature than the preliminary quarterly estimates (QE) of GDP, which are compiled using sales and supply-side statistics as well as demand-side statistics, including the

[1] The Statistical Commission of the Cabinet Office pointed out that in the FIES, a certain age group (i.e., elderly households) accounts for a slightly higher share than the actual demography (Statistical Commission of the Cabinet Office, "2014 Report on the Statistics Act," March 2016). See Appendix 1 for some underlying problems of the FIES.

FIES.

In section 2, we describe the aim of the CAI. Section 3 provides details on the compilation methodology. Section 4 cross-compares the index with other consumption-related indicators and examines its merits and drawbacks. Section 5 offers an overview on recent developments of the CAI, and Section 6 concludes.

2. Aim of the CAI

The CAI was initiated to meet three aims. First, the index reflects actual consumption trends. Second, it comprehensively contains consumption of goods and services as a structure of consumption. Third, it is delivered promptly and can be constructed with ease. Details on these aims are described below.

(1) Reflecting Actual Consumption Trends

The CAI aims to reflect actual consumption trends. "Actual trends" are assessed based on private consumption[2] movements in the ARNA. The ARNA is identified to be the most reliable statistics for tracking movements in private consumption.[3] For this reason, if private consumption in the ARNA and the CAI shows similar movements, this should prove the CAI to be a desirable measure for private consumption. The CAI, as already mentioned, uses sales and supply-side statistics as its source statistics. The same type of statistics is also used for the ARNA, implying that the two indexes should move in sync.[4] In the following, we construct the CAI and see whether it really moves like the ARNA in comparison to other indexes.

Time series data of demand-side statistics are not used for compiling the CAI. It

[2] The official name is "Consumption of households (excluding imputed rent)" in the SNA terminology.

[3] Source statistics used for compilation of the ARNA are sample surveys, and therefore, private consumption of the ARNA is an approximation of "true private consumption developments." The source statistics are, however, the most detailed data available now and private consumption of the ARNA is considered to be the most appropriate approximation of "true private consumption developments."

[4] It should be noted, however, that the ARNA uses supply-side statistics, namely, *Census of Manufacture* (METI), which is released with a considerable time lag. This means that the ARNA is released with a time lag of about one year for a given period and of roughly two years for the even highly accurate revised ARNA.

has been pointed out that demand-side statistics, such as the monthly released FIES, are likely to show sample biases; in many cases, they exhibit inconsistent time-series movements compared with other consumption measures, accompanied by large monthly fluctuations. These features make it difficult to trace actual private consumption trends. The QE of the SNA – which uses demand-side statistics as its source statistics on estimation – also faces the same problem. Weights used for aggregating a number of source statistics rely on FIES data. While it is difficult to use FIES data for assessing monthly trends of private consumption, the FIES data are useful for capturing the structure of private consumption.[5]

(2) Comprehensiveness

To contain goods and services comprehensively, the CAI is compiled after choosing – from a range of government statistics and industry surveys – the most suitable indicators.

Looking first at goods, the data series of the CAI generally relies on those of the CSC (METI). The data series include food/beverages and apparel sold at department stores, supermarkets, and convenience stores as well as household electronics sold at specialty stores. For some goods, however, we use data from industry surveys and other statistics, since their coverage is considered to be more relevant than those in the CSC.

As for services, many series included in the ITA are used.[6] These series contain expenses for health and medical care, nursing care, communications, and entertainment. Since demand-side statistics, such as the FIES, are used for some series of the ITA, such as automobile maintenance services, problems unique to demand-side statistics, like sample biases, are reflected in the series directly. To prevent this, instead of using the relevant series of the ITA, we use data from industry surveys (travel and eating out) for some items or we exclude some data series (laundries, beauty and bath services, photographic studios, and automobile maintenance services[7]).

[5] For details, see Appendix 1.

[6] The Ministry of Internal Affairs and Communications publishes the *Monthly Survey on Service Industries*, which provides sales and supply developments of the services industries. However, the time series data are very short, so they were not used for compiling the CAI. Once sufficient time series data become available in the future, we may include the data series in the CAI.

[7] Automobile maintenance services are first categorized as goods instead of services to correspond

(3) Prompt delivery and simple compilation procedure

Economic judgments should be made in a timely fashion. From this viewpoint, the CAI is constructed conditionally that it is delivered promptly and that its compilation procedure is simple, drawing on a wide array of consumption indicators released on a monthly basis. As previously mentioned, since the data series used for the CAI are comprised mainly of *Current Survey of Commerce* (goods), *Indices of Tertiary Industry Activity* (services), and industry surveys, they are available in monthly terms. However, since the ITA – used for services consumption – are released with a slight time lag, the overall index is compiled including some preliminary figures which are estimated using industry surveys or extrapolated from other figures.

Based on the above thinking, the Bank of Japan previously provided *Indices of Aggregated Sales* over the period from October 2000 to October 2009. This index was calculated as the weighted average of major sales indicators of goods and the consumption spending indicators of services consumption including eating out and travel. In contrast, the CAI provides extensive coverage of services consumption, and, added to eating out and travel, it further expands to include spending on cellular phone charges, health and medical care, and nursing care, factoring in their growing proportion on overall consumption these days.

(4) Other considerations

A few issues should be considered when compiling the CAI. First, survey measures on sales and supply include goods and services provided to both households and firms. Ideally, however, consumption on the corporate side should be removed to track consumption trends in the household side of the economy. This is done so by (i) assuming that time-series changes in household consumption and corporate consumption are the same (for many goods and services) and (ii) using appropriate industry statistics that involve goods and services provided directly to households (automobiles, electricity, and gas).

Second, sales statistics include the oft-mentioned inbound consumption, consumption by foreign tourists, which has increased dramatically in recent years. Along with the definition of the SNA statistics, inbound consumption should be

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with the SNA categorization, and then estimated on the assumption that they are proportional to the number of automobiles held using the base weight.

excluded to capture the consumption structure of the Japanese.[8] The CAI is compiled taking this aspect into account. Consumption of the Japanese is identified by adding the amount spent overseas by these households as well. With this adjustment, the CAI matches the coverage of private consumption as defined in the SNA. Chart 1 shows the relationship of each component of private consumption. It is appropriate to analyze the CAI adjusting travel balance, which excludes inbound consumption of foreigners and includes overseas consumption activities of the Japanese to capture consumption activities of the Japanese.

An index that does not adjust the travel balance, including inbound consumption, is useful for evaluating consumption trends of households from the firms' sales side. For this reason, the CAI also compiles an index that does not adjust the travel balance including inbound consumption.

Third, the CAI is a Laspeyres index with fixed weights. The SNA data is a chain-weight index. Comparing with the SNA data, a Laspeyres index could have upward bias as the latest data are far from the base year. However, the difference between the SNA data and the CAI due to their compilation methodologies is not supposed to be so large because the latest data points are not far from the base year. In fact, there is no evidence that the compilation methodology causes any significant deficiencies in capturing the actual trends of private consumption compared with other indicators based on the empirical results shown later up to 2014.

It should be noted that, collectively, these indexes need to be observed in real terms – meaning that the impact from price changes should be removed. Therefore, real indexes are also compiled for the CAI.

3. Detailed Compilation Methodology of the CAI

In the following, we provide details on the compilation methodology of indexes comprising the CAI.

[8] Strictly speaking, private consumption in the SNA is defined as the sum of consumption of the Japanese living in Japan and those of the foreigners living in Japan. For convenience in the rest of the paper, "Japanese" represents people living in Japan.

(1) Nominal CAI

The Nominal CAI represents weighted averages of a variety of sales and supply-side indicators, and its base year is 2010.[9] First, sales and supply-side statistics are aggregated according to goods/services type (durable consumer goods, non-durable consumer goods, and services) using weights of the FIES, *Input-Output Tables for Japan*, and other surveys. They are eventually aggregated to form the Nominal CAI using weights of each goods/services type in the SNA (Chart 2).[10] Data begin in 2003.[11]

First, we describe how goods/services are aggregated.

Source statistics used for goods are listed in Chart 3. Data for durable consumer goods rely on automobile sales of industry surveys and sales of household electrical appliances in the CSC.[12] Data for automobile sales are derived from new passenger-car and small-car registrations – due to their high proportion among cars purchased by households – instead of the CSC data (sales at car dealers) since this is a sample survey conducted on retail stores that tends to include corporate demand to a considerable amount. Sales of household electrical appliances take in indices of retail sales of machinery and equipment in the CSC. They are aggregated using weights of the FIES. Data for non-durable consumer goods[13] are based on the following indexes: sales of retail trade (food and beverages sold at department stores, supermarkets, and convenience stores); sales of retail trade (apparel sold at department stores and supermarkets); sales of retail trade (dry goods, apparel and apparel accessories); sales of retail trade (fuel stores), and sales of retail trade (others) in the CSC. Added to these, source data include: game software – a

[9] As described later on, the real amount is derived from calculating the 2010 Laspeyres index using the fixed-base method. Figures associated with the *Input-Output Tables for Japan* uses those as of 2011.

[10] All indexes are seasonally adjusted. The specifications of seasonal adjustments will be published in the Bank of Japan's website.

[11] Of the constituent series, the duration is made to match the longest period possible for time-series data such as medical services.

[12] Other durable goods such as furniture are categorized in "department stores and supermarkets" and "retail sales of others" in the CSC. Since it is impossible to extract these durable goods from "retail sales of others," we only use automobiles and electrical appliances for the CAI's durable goods category.

[13] Apparel goods are categorized as "semi-durable" consumer goods in the SNA. We categorize apparel goods in non-durable goods in the CAI because we cannot extract sales of apparel goods from "Other retail sales" in the CSC.

subcomponent of information services in the *Current Survey of Selected Service Industries* (METI) – automobile maintenance services (derived from the Ministry of Land, Infrastructure, Transport and Tourism's survey on the number of automobiles held), electricity and gas charges identified in industry surveys[14] as well as water supply, newspaper and book/magazine fees, derived from subcomponents of the ITA.[15] Non-durable consumer goods are eventually aggregated from the weighted average of these components using weights of the FIES and the CSC.

Services are derived from the weighted average of items related to services consumption in the ITA and sales amounts of industry surveys using weights of the FIES. A summary list of the source statistics used is shown in Chart 4. Source statistics are comprised of indicators including travel and eating out – those sensitive to business cycles – and also medical and nursing care services as well as communications which have seen a steady uptrend in consumption demand. As mentioned in the above, some series – eating and drinking places, etc. – of the ITA are based on the FIES data series, meaning that problems unique to the FIES, such as sample biases, are reflected directly in these series. For those services, we use industry surveys (travel and eating out) instead or isolate some items (laundries, beauty and bath services, and photographic studios) in the aggregation process. Travel covers both domestic and overseas travel by Japanese citizens. This contrasts with the ITA which includes travel by foreign citizens as well.

Services consumption in the SNA includes imputed rent, while it is excluded when calculating the CAI. That is, the CAI covers spending by households based on market transactions. Therefore, when cross-comparing performances of the CAI in the following section, imputed rent is isolated from SNA's private consumption. According to the 2011 *Input-Output Table for Japan* (MIC), the weight of imputed rent represents 17 percent of private consumption.

[14] Data series of electricity and gas charges are also in existence in the ITA. Nevertheless, these series are constructed from a collection of source statistics that include a certain amount of corporate consumption (electricity charges are based on the amount of electric energy generated and received; gas charges on the amount of gas production nationwide <including purchases>) and hence regarded to be ill-fit for the CAI, the focus of which is on household consumption. Instead, the CAI uses the amount of electricity sales -- containing a high proportion of electricity catering for household demand -- for electricity charges and the amount of gas sold to households for gas charges.

[15] Electricity and gas charges, subcomponents of the ITA, automobile maintenance services, and automobile sales are real figures. The nominal values of these items are calculated by using the corresponding price indexes.

The CAI excludes some services, such as laundries, beauty and bath services – which are included in the ITA – because the data series of those items in the ITA use the FIES as their source statistics.[16] They are treated this way to avoid monthly fluctuations of the FIES. These services are not used in the aggregation process in the CAI, but the weights applied to the total aggregation are from the SNA which includes these excluded services. It should be noted that this treatment is equivalent to the assumption that these items of services consumption move in tandem with the total of all covered items.

(2) Nominal CAI (adjusting travel balance)

The above nominal CAI includes the oft-mentioned inbound consumption, a phenomenon in which spending by foreign visitors has seen an upsurge in recent years. To identify consumption trends of Japanese households, an index excluding inbound consumption of foreign visitors is also deemed useful.[17] To conform to the SNA definition of private consumption, goods and services purchased overseas by Japanese citizens should be included in consumption as well.[18] The above-calculated nominal CAI is converted into a monetary amount using the amount spending based on the SNA2010 and then excludes the travel balance of the *Balance of Payments Statistics* (Ministry of Finance and Bank of Japan).[19] The derived figures are indexed based on the monetary value as of 2010.

(3) Real CAI and Real CAI (adjusting travel balance)

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[16] Specifically, some services are identified as laundries, beauty and bath services. Although these items are included in the ITA, they are based on the FIES data series. Therefore, these items may be affected heavily by time-series movements stemming from samples of the FIES. Such services spending accounts for 1.7 percent of household spending (2011 *Input-Output Table for Japan*). House and room rents in the ITA (with a weight of 4.5 percent in the 2011 *Input-Output Table for Japan*) is also excluded. Based on an empirical analysis in this paper, overall performance of the CAI, excluding house and room rents, is much better than the CAI including house and room rents. Therefore, we use the CAI excluding house and room rents as our benchmark indicator.

[17] As shown in Chart 1, inbound consumption of foreign visitors is not included in the SNA's private consumption; rather, it is listed as exports.

[18] In the SNA, goods and services purchased overseas by Japanese citizens are included in private consumption. With the equivalent amount recorded as imports of goods and services, they are subtracted from the total GDP.

[19] Since the SNA's private consumption excludes inbound consumption of foreign citizens on one hand, while it includes overseas spending by Japanese citizens on the other, "travel balance = inbound consumption of foreign citizens less overseas spending by Japanese citizens," recorded in the *Balance of Payments Statistics*, is subject to exclusion.

The above indexes are all in nominal terms and thereby susceptible to price changes. For this reason, real indexes – compiled by removing the impact from price changes – are also provided for analyzing consumption trends.

As for the real CAI not adjusting travel balance, real amounts of individual series are first compiled and then averaged using appropriate weights. To compile individual series in real terms, we deflate nominal series in existence by the corresponding price indexes for some items and use real series as they are if these items are readily available. Individual items and their corresponding price indexes are provided in Chart 5.

Next, the real CAI adjusting travel balance is compiled from a different approach. As for inbound consumption, data subdivided by item such as household appliances and accommodation fees are released only once every quarter. In addition, the detailed data of overseas consumption by the Japanese are not available. For these reasons, an aggregate deflator is first compiled by dividing the nominal CAI by the real CAI. The real CAI (adjusting travel balance) is then constructed by dividing the nominal CAI (adjusting travel balance) by this deflator.[20]

Due to this compilation methodology, it is impossible to conduct a breakdown analysis (contribution analysis) on the real CAI (adjusting travel balance), that is to say which factor change has been feeding through to the overall change. However, we do not see this as much of a problem, because as mentioned later on overall movements in the short run of both indexes turn out to be quite similar. Therefore, we are able to gauge the contribution of each factor to the changes in the adjusted series, by focusing on the breakdown of the non-adjusted series.

(4) Real CAI Plus

Consumer tastes as well as goods and services provided by firms tend to change rapidly in a short cycle. As a result, statistics capturing these movements may not be available instantaneously, and furthermore, even if source statistics do become available, the length of the available time-series data may be insufficient for economic analysis. With this in mind, a new index called “real CAI Plus” is compiled so as to take in goods and services of statistics released on an ongoing

[20] This is done so provided that the deflator for travel balance is the same as that for consumption other than travel balance.

basis as well as to quickly respond to changes in consumption trends. The real CAI Plus is not fit for use as long-term time-series data; rather, it is should act as a supplementary index for the original series of the real CAI.

The real CAI Plus compiled in this paper contains statistics on digital contents delivery services that has recently seen growing demand. Specifically, the index provides data beginning in 2008 when contents distribution data became available. Chart 6 describes additionally adopted items and their characteristics.

4. Performance of the CAI

This section examines the characteristics of the above CAI by drawing on other comprehensive consumption-related indicators. First of all, we compare the CAI with the ARNA – regarded as to be the most precise measure on private consumption.[21] The accuracy of the CAI to trace trends of consumption is evaluated by checking whether the CAI shows movements similar to the ARNA compared to other indicators. Next, to gauge short-term properties of the CAI, we compare the size of monthly/quarterly fluctuations of the CAI with those of other indicators and analyze the correlation with other several consumption-related confidence indicators. The smaller the monthly/quarterly fluctuations, the easier it becomes to assess the trend of private consumption. Furthermore, the higher the correlation with other consumption-related confidence indicators, the closer the index is to "real feel" of consumers and businesses associated with private consumption as regards to monthly and quarterly fluctuations.

(1) Cross-comparison with the ARNA

First, to verify the accuracy of the CAI, we identify the similarity between movements of the CAI and ARNA to see if the CAI better serves as an index for tracing consumption trends than other consumption-related indicators. As mentioned above, the ARNA was chosen for this assessment due to its comprehensiveness and utility as the most precise consumption measure available. All comparable indicators are in real terms. Calendar-year (CY) figures are used for comparison. The reason is that ARNA estimates use the calendar year for its basic

[21] The ARNA until CY2013 are estimated with more detailed data compared with the ARNA for CY 2014. We assume that data up to CY2013 and that of CY2014 are accurate almost to the same degree, in contrast to that of CY 2015, which use demand-side statistics for its estimation.

data.[22] , [23]

The following five consumption-related indicators are used for cross-comparison: (i) sales at retail stores in the CSC; (ii) broad-ranging personal services released as re-edited series of a subdivision in the ITA; (iii) aggregate supply of consumer goods (*the Index of Industrial Domestic Shipments and Imports, Consumer Goods* <METI>); (iv) consumption expenditures in the FIES; and (v) *Household Economy Consumption Index* (MIC) – compiled from a combination of the FIES and *Survey of Household Economy* (MIC). Since surveys (iv) and (v) represent per household figures, changes in the number of households and the changing compositions of one-person households and two-or-more person households are collectively adjusted into an all household basis, converted into comparable data to the ARNA and the CAI.

Graphs in Chart 7 serve to illustrate the results of this cross-comparison. Time-series movements reveal that movements of the CAI are most similar to those of the ARNA. The size of discrepancy between other consumption-related indicators and the ARNA was large, and the expansion of this discrepancy has particularly stood out in recent years. To confirm this fact in numerical terms, we show in Chart 7 the discrepancy between the ARNA and other consumption-related indicators derived from calculations on the Root Mean Squared Error (RMSE), Mean Absolute Error (MAE) and the correlation coefficient. For the RMSE and MAE, the smaller the better; for the correlation coefficient, the higher the better. With this in mind, our results show that the discrepancy between the CAI and the ARNA was smaller than other indicators, and that the correlation between the two was the highest.

The above results suggest that the CAI could capture consumption trends of households in the ARNA relatively well compared to demand-side statistics – the

[22] Fiscal-year figures are also available, but since they are calculated after CY figures are divided into quarterly amounts using demand side and other statistics, they are not used here so that the effects of demand-side statistics do not feed through to this analysis. Note that original data of some components in the index, such as medical and nursery care, are only available on a fiscal year basis so quarterly figures are estimated by using those data.

[23] The proportion of coverage in the CAI in relation to the ARNA was roughly 80 percent for the number of items and the amount of value added alike. In theory, the coverage of the FIES is more or less 100 percent, excluding imputed rent, since it includes all items listed in household accounts. However, sample biases prove that consumption trends are not traced properly even if the coverage of items is high.

FIES and the *Household Economy Consumption Index* – and to the aggregate supply of consumer goods, compiled from statistics covering production such as *Indices of Industrial Production* (IIP).

(2) Monthly and quarterly fluctuations

For economic assessment, a useful indicator is one that exhibits little monthly and quarterly fluctuations so capturing the actual consumption tendencies comes with ease. On this view, the FIES, a typical example of demand-side statistics, covers only a limited number of roughly 9,000 samples as a proportion to approximately 52,000,000 households in total (as a ratio of about 0.02 percent), and the sample size of the FIES is not large enough to allow household expenditures of some households to be offset by those of other households.[24] Therefore, a vast amount of spending on a particular item, by chance, among some households covered in the survey feeds through to the total aggregate. Monthly fluctuations then become significant, making it difficult to assess consumption tendencies. The *Synthetic Consumption Index* (Cabinet Office) and the QE of GDP, both relying on the FIES as their source statistics, are also susceptible to such monthly fluctuations. Although a phenomenon specific to goods, the aggregate supply of consumer goods – compiled mostly from statistics covering production (IIP) – also shows sharp monthly fluctuations, due in part to the limited number of items covered in the source statistics. Some fluctuations might provide useful information. It is important that we should use various indicators with different aspects and anecdotal information provided by firms in a comprehensive way.

On top of the five indicators used in the previous section, we evaluate short-term fluctuations by adding pseudo GDP figures (real-time SNA-based private consumption (preliminary estimates), *real-time QE*), which is constructed by using quarter-to-quarter changes of the first preliminary figures of the QE. Movements of the FIES are thought as to have a large impact on the quarter-on-quarter changes of the real-time QE. The *real-time QE* is largely affected by quarterly changes of the FIES. In addition, the quarterly figures of private consumption of the ARNA, which are supposed to be an accurate measure of private consumption tendencies, are used for evaluation. The quarterly figures of the ARNA are basically constructed by dividing the calendar-year figures with the FIES data and other figures, and

[24] Samples currently amount to 8,749 households. Among these, two-or-more-person households and one-person households represent 8,076 and 673 samples, respectively.

therefore there may be influences coming from short-term fluctuations in the FIES data.

Our results show that fluctuations in the CAI, alongside the index on broad-ranging personal services, are smaller than other indicators (Chart 8). This is because (i) the coverage of sales and supply statistics on goods and services – those are source statistics of the CAI – is wide and (ii) even if goods and services items provided to households are replaced with other items, which reflects a shift in household spending behavior, all items are included in the sales and supply amount of goods and services, meaning that its information is more or less complete. Therefore, the CAI is regarded as a "robust" index unaffected by shifts in household spending behavior. Although the index on broad-ranging personal services also derives some of its information from the FIES, it shares most of its source statistics with the CAI, and its usage of supply-side statistics is thought to have resulted in its good performance.

Meanwhile, as mentioned earlier on, the FIES shows sharp monthly fluctuations since the number of samples covered is limited in proportion to all households. The coverage of the IIP – which is the source statistics for the aggregate supply of consumer goods – is incomplete in the sense that goods included as its coverage are fixed at the base year. Therefore, movements such as shifts in household spending behavior and increased consumption of new goods are not captured in the statistics. The problem with both the FIES – constructed based on household account books of sample households – and the aggregate supply of consumer goods – covering specified goods – is their incompetence to trace consumption tendencies in a comprehensive manner.

(3) Cross-comparison with other confidence indicators

Confidence indicators are counted as a useful indicator for assessing short-term fluctuations in private consumption. Currently, there are several confidence indicators on private consumption. Among them, this paper looks at three representative indicators – (i) the *Consumer Confidence Index* (Cabinet Office), (ii) the DI for current conditions (household activity-related) in the *Economy Watchers Survey* (Cabinet Office), and (iii) the business conditions DI in association with consumption activity in the *Tankan* (Bank of Japan) – and examines the correlation between these confidence indicators and consumption-related indicators, including

the CAI. Since the consumption-related indicators show upward trends in the long run, we extract cyclical components of each consumption-related indicators by subtracting the linear trend components from the actual figures and see how much cyclical components of each consumption-related statistics are correlated with confidence indicators. This way the cyclical correlation between consumption-related indicators and confidence indicators can be measured appropriately.

The results are given in Chart 9. First, as for the *Consumer Confidence Index*, it is most highly correlated to the index on the broad-ranging personal services of the ITA. The correlations between the *Consumer Confidence Index* and the CAI and the quarterly figures of private consumption of the ARNA are also about the same. The correlations with other indicators are low. Next, we look at the correlation with the DI for current conditions (household activity-related) in the *Economy Watchers Survey*. The results are similar to those with the *Consumer Confidence Index*. Finally, we confirm the correlation with the business conditions DI of industries with ties to private consumption in the Bank of Japan's quarterly released *Tankan* survey. The business conditions DI of industries related to private consumption is defined as the weighted average of the business conditions DI of three industries – retailing, services for individuals, and accommodations, eating & drinking places – with the weights of the number of enterprises in the *Tankan* population. This, too, shows results that are identical to the above two confidence indicators.

(4) Overall assessment

On top of the empirical analysis provided in this section, we also take into account the compilation methodologies and adjustment methods to make an overall assessment of the CAI and other consumption-related indicators (Chart10).

As to the empirical analysis, the index on broad-ranging personal services in the ITA was determined to be viable in the same way as the CAI. In terms of compilation methodologies and appropriate adjustments, the CAI is evaluated more on its relative merits than on the index on broad-ranging personal services, due to its adjustment for inbound consumption and to its disuse of the FIES data.

5. Recent developments of the CAI

We provide here an overview on the recent developments of the CAI. Chart 11 (1) illustrates the levels of nominal and real figures. It shows a front-loaded increase in demand followed by a subsequent decline around when the consumption tax was raised in April 2014. These levels started to improve gradually in the aftermath of this event and have recently held steady. The most recent movements of nominal figures decomposed into quarterly and monthly contributions are depicted in Chart 11 (2). Movements of the past 12 months on quarterly terms show that services and non-durable consumer goods rose at the turn of 2015, whereas durable consumer goods were somewhat depressed. From mid-2015 onward, with the impact from irregular weather conditions and other factors having worked through, non-durable goods became somewhat sluggish, while durable consumer goods leveled off. Real figures, indicated in Chart 11 (3), generally show movements similar to those in nominal terms.

Next, we confirm changes in the level of consumption according to goods/services type (Chart 12). In terms of durable consumer goods, there were many events to boost purchases of durable goods, during the economic downturn in the aftermath of the Lehman shock, and thereafter. The bulk of demand stimulus measures during the crisis was the subsidies for purchases of energy-efficient cars and the eco-point system for electrical appliances, followed by a chain of events, the switchover from analogue to digital terrestrial broadcasting, a front-loaded increase in demand prior to the consumption tax hike, and the ending of support for some software. Hence, consumption of durable consumer goods has seen a consecutive upsurge since 2009 onward. As a result of these front-loaded purchases, consumption of durable consumer goods has continued to be lackluster with adjustment pressures on stocks of durable goods having intensified recently. Non-durable consumer goods have recently continued to show somewhat sluggish movements. There are largely two causes for this: a decline in energy-related consumption, including electricity consumption and gasoline, and a fall in demand for publications and newspapers. Together with energy-efficient cars and electrical appliances, increasing prevalence of energy-saving measures taken after the nuclear power plant accident and solar system generators are thought to have dampened energy-related consumption. The downshift in demand for publications and newspapers is likely to be associated with free access to online news, accompanied by the widespread use of smartphones.[25] Services have tended to grow steadily. This uptrend

[25] Although e-books have rapidly increased their presence nowadays, statistics capturing purchase of e-books does not exist at this current stage and thereby, with this portion left out, consumption from a macroeconomic perspective is likely to be underestimated. The CAI Plus does include contents distributions: it includes those only of music and videos, while books and newspaper

was created by cellular phone charges and medical/nursing care services which have seen expanding demand. Although services consumption momentarily dropped during the recession period following the Lehman shock, this was caused by selective services consumption, exemplified in travel and eating out – services that tend to be influenced by business cycles.

Here, we look at the real index adjusting travel balance. Chart 13 suggests that the level of the index is somewhat low, factoring in that it excludes the portion of inbound consumption, but has recently been moving more or less in sync with the series not adjusting travel balance.

We compare the CAI with private consumption (consumption of households <excluding imputed rent>) in the SNA (Chart 14). The average annual growth rate from 2010 – using data comparable to the ARNA through 2014 – both the CAI and ARNA registered an increase of 0.7 percent for consumption. Nevertheless, annual growth rate in 2015 for GDP consumption (based on the QE) – estimated using demand-side statistics – stood at negative 1.8 percent while the CAI shows the decline of 0.7 percent registering 1 percent higher growth than GDP consumption. Regardless of the differences, consumption has recently shown relatively anemic growth. This can be explained by disappointing sales of seasonal products, such as apparel, brought on by weather effects.

Here, we construct the average propensity to consume based on the CAI – after conversion into nominal values using SNA-based private consumption – using compensation of employees in the GDP, and compare it with the average propensity to consume derived from SNA-based consumption (Chart 15). Up until 2014, the two indicators had moved in tandem, whereas from mid-2014 onward, the dichotomy has become pronounced, with the size of decline becoming strikingly evident since the turn of 2015. Consumption as a whole lacked vigor to some extent as the second and fourth quarters of fiscal 2015 saw weather effects as forces bearing down on consumption. However, the CAI suggests that the consumption propensity could not have dropped as much as that measured by private consumption in the GDP.

Finally, notwithstanding the short time series, we look at movements in the CAI Plus, which is thought to reflect a more accurate picture of recent consumption tendencies. As

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distributions through online are not covered. Online sales of overseas companies tend to be underestimated in the CAI as well since they are not covered in the CSC.

can be confirmed in Chart 16, the CAI Plus has shown a moderate uptrend like that in the CAI. The CAI Plus, however, has recently shown higher growth than the original series since it includes content distribution, which has faced expanding demand of late.

6. Conclusion

In this paper, we introduced the CAI. The CAI is based on a variety of sales and supply-side statistics on goods and services (*Current Survey of Commerce*, *Indices of Tertiary Industry Activity*, and industry surveys). It is high-frequency (e.g. monthly, quarterly) data, and is also regarded to be an indicator that traces consumption trends in a timely manner. The CAI moves in tandem with the ARNA – the most comprehensive measure representing consumption activity within Japan – but unlike the ARNA, it is delivered more promptly. Added to this, in contrast to demand-side statistics such as FIES data, the CAI shows smaller fluctuations emanating from sample rotations and it also exhibits a high correlation with various confidence survey indicators. Various versions of the CAI are available – nominal and real indexes as well as those both including and excluding inbound consumption – and they are designed to help users according to their analytical needs. Based on the above-mentioned properties, the CAI will contribute to proper assessment of the actual movements of consumption activities in Japan.

The monthly index is to be released in the "Research Data" section on the BOJ website on the fifth business day of each month in principle.[26] Since sales statistics, on which this index is based, are released according to their respective timetable, some data for the most recent month will be extrapolated from other available data.[27] For this reason, historical data will also be updated on a monthly basis. The website will provide time series data of five indicators, namely the real CAI, real CAI (adjusting travel balance), nominal CAI, nominal CAI (adjusting travel balance), and real CAI Plus. The graphs of the real CAI and real CAI (adjusting travel balance) will be published as well. Data of the source statistics used for compiling the CAI are to accompany the release of this research paper.[28] This is done so to gather comments from users regarding the

[26] Data available at "Research Data" which is a subcategory of "Research and Studies" on the BOJ website (http://www.boj.or.jp/).

[27] The year-on-year average of the relevant index for the previous three months is used for extrapolation.

[28] Background data used in this paper are available at "Details, explanations, scheduled updates, etc." in "Consumption Activity Index" in "Research Data" on the above BOJ website.

methodology and other elements in view of improving the index on an ongoing basis.

Finally, there are three considerations for this index. First, it should always be kept in mind that even sales and supply-side statistics may contain sample biases due to the fact that they are in fact sample surveys. This paper has compared historical data of the CAI with the ARNA which is thought to be the most comprehensive and precise measure available. We will continue to perform such examinations and make improvements to the index when necessary. Second, the inclusion of new goods and services to the index should be considered on an ongoing basis. Capturing movements of these new items is attempted in the supplementary index called real CAI Plus, since it is very important that we include these movements in a timely manner in numerical terms amid rapidly changing consumer tastes and a good supply of new products provided by firms. Third, analyses using higher-frequency data could be pursued in the future. Big data is used in a broader spectrum of fields nowadays. Sales statistics mentioned in this paper also contain data collected by firms on a daily or even hourly basis. Analyses with high precision and with even more frequencies may be performed by exploiting such data.

Appendix 1: Issues of Using the *Family Income and Expenditure Survey* as a Business-Cycle Indicator

It has long been pointed out that actual consumption activity might not be represented in the *Family Income and Expenditure Survey* (FIES) in a precise manner. This is thought to be attributable, in particular, to the following two elements: (i) households covered in the survey are skewed heavily toward a specific set of cohorts – meaning that the survey is ill-suited for evaluating consumption activity of the overall economy and (ii) with the limited number of households covered in the survey, the outcome may change dramatically depending on whether there was a large amount of spending, by chance, of certain households.

The first element was also mentioned in a report by the Cabinet Office's Statistical Commission this March, citing that the distribution of samples collected for this survey was possibly distorted due to the fact that a share of a certain age group (i.e., the elderly) was higher than that of the actual demography and the need to correct this bias so as to make the picture closer to that of the actual economy has been a subject of debate. Specifically, it was pointed out that respondents for the survey might possibly be skewed heavily to a specific cohort exemplified in households staying at home during daytime, namely the elderly and housewives, and that the survey was incomplete in the sense that movements of double income households were not fully covered. (Statistical Commission of the Cabinet Office, "2014 Report on the Statistics Act," March 2016.)

Indeed, the dichotomy between income of household head in the FIES and wage per employee in the *Monthly Labour Survey* (Ministry of Health, Labour and Welfare) has recently become pronounced, with the distortion among sample households of the FIES having become even more noticeable of late (Chart 17). Since sample households of the FIES are selected based on groups divided according to region (survey unit), and information on the households is limited before sampling, and thereby, constituents including age and annual income of households are disregarded in the sampling process. Furthermore, this sort of bias in the household profile (although modified to some extent) is not corrected when aggregating data of individual households. In fact, since the FIES requires extra work to fill out its survey forms, households willing to cooperate are likely to be strongly biased towards a certain group due to this burden.

As to the second element, a cross-comparison with other indicators in this paper showed

that both monthly and quarterly fluctuations in the FIES were significant. It also exhibited a relatively low correlation with confidence indicators.

Due to a variety of underlying issues mentioned above, the Statistical Commission in its report to the Statistics Bureau of the Ministry of Internal Affairs and Communications noted that the original purpose of the FIES was to capture the structure of household consumption (microeconomic statistics) and that, despite being used for tracing monthly macroeconomic activities, thanks to its comprehensiveness in tracking consumption in the household side of the economy and prompt monthly delivery, it contained limitations as a sample survey.[29] Dr. Nishimura, Chair of Statistical Commission, also concluded by saying that the existing FIES has little room left for improvement even if corrections are made using methods in line with those proposed by the Council on Economic and Fiscal Policy, and that it had become even more difficult to use it as a business-cycle indicator.[30]

[29] Ministry of Internal Affairs and Communications, Statistics Bureau, 2016, "Current overview on the Family Income and Expenditure Survey"; p. 28 of material handed out at the 67th basic planning meeting of the Statistical Commission of the Cabinet Office
http://www5.cao.go.jp/statistics/meetings/kihon_67/kihon_67.html.; available in Japanese only.

[30] Cabinet Office 2016, "Minutes of the 2016 4th Council on Economic and Fiscal Policy"; available in Japanese only.

Appendix 2: Q&A on the *Consumption Activity Index* (CAI)

Here, we provide information in Q&A format to help users understand the structure and content of the CAI.

Q1: What was the motive behind initiating the CAI?

A1: We wanted a consumption indicator which (i) covers a vast range of consumer goods/services, (ii) properly represents the trend of private consumption, and (iii) is available on a monthly/quarterly basis.

Q2: We already have a monthly indicator on private consumption, the *Family Income and Expenditures Survey* (FIES). How is the CAI different from this?

A2: Since the number of samples covered in the FIES is limited, a large amount of spending of certain households, by chance, has significant implications on the survey outcome. Added to this, with the extra work needed to fill out the forms, it has been said that these samples are likely to be biased, oriented towards households with relatively high time flexibility, including housewives and the elderly. In contrast, the CAI primarily uses sales statistics as its source statistics, meaning it to be less affected by fluctuations and distortions in the samples than the FIES; it also shows only slight monthly fluctuations and is thought to be useful for tracking consumption trends from a macroeconomic perspective.

Q3: What accounts for the differences in the CAI and the *Current Survey of Commerce*?

A3: The *Current Survey of Commerce* is characterized to be insufficient for capturing movements of private consumption in a comprehensive manner, since it does not contain services consumption – a component comprising more than 50 percent of private consumption. The CAI, on the other hand, is featured by including movements of services on the sales side using a variety of statistics, including sales and supply-side statistics, associated with services consumption – a subcomponent of the *Indices of Tertiary Industry Activity* – as well as industry surveys.

Q4: How different is the *Synthetic Consumption Index* released by the Cabinet Office from the CAI?

A4: The *Synthetic Consumption Index* captures movements of Quarterly Estimates (QE) of GDP on a monthly basis so it uses volatile demand-side statistics, like the QE, in addition to supply-side statistics.

Q5: What accounts for the differences in the CAI and the GDP statistics (QE)?

A5: For the QE of GDP, in addition to supply-side statistics, demand-side statistics are used, which show large fluctuations. The CAI, on the other hand, does not use demand-side statistics basically.

Q6: Does it include “explosive buying” by foreign visitors?

A6: The CAI provides two measures: one including explosive buying (voracious shopping behavior) by foreign visitors (inbound consumption) and another excluding this element. The CAI not adjusting travel balance includes inbound consumption and it should be used when looking at business conditions from the retail side. On the other hand, the CAI adjusting travel balance excludes inbound consumption and it is useful for tracking consumption trends solely of the Japanese people.

Q7: Are online transactions included in the CAI?

A7: The CAI contains online sales conceptually if these transactions are made by stores in existence subject to coverage in the *Current Survey of Commerce* and *Indices of Tertiary Industry Activity*. Businesses engaged solely in online sales are categorized as “non-store retailers” in the *Current Survey of Commerce*, but the CAI does not include sales activity of “non-store retailers” because the time series data is too short and detailed data on durable and non-durable goods are unavailable separately. Even in the *Current Survey of Commerce*, the sales indicators may not be able to fully illustrate the actual picture because businesses specializing in online sales expand so rapidly these days. Added to this, it should be noted that purchases made directly from foreign companies are unlikely to show up in Japanese statistics.

Q8: Are smartphone games, music and video distributions, and e-books included?

A8: Smartphone games are included in the original series. The source statistics for this category is “game software” in information services (computer programming and other software services) of the *Current Survey of Selected Services Industries*. Music and video distributions are included in “digital contents delivery services” in the CAI Plus. E-books are not included due to the absence of source statistics.

References:

Ministry of Internal Affairs and Communications, Statistics Bureau, 2016, "Current overview of the Family Income and Expenditure Survey"; material handed out at the 67th basic planning meeting of the Statistical Commission of the Cabinet Office
http://www5.cao.go.jp/statistics/meetings/kihon_67/kihon_67.html.;
available in Japanese only

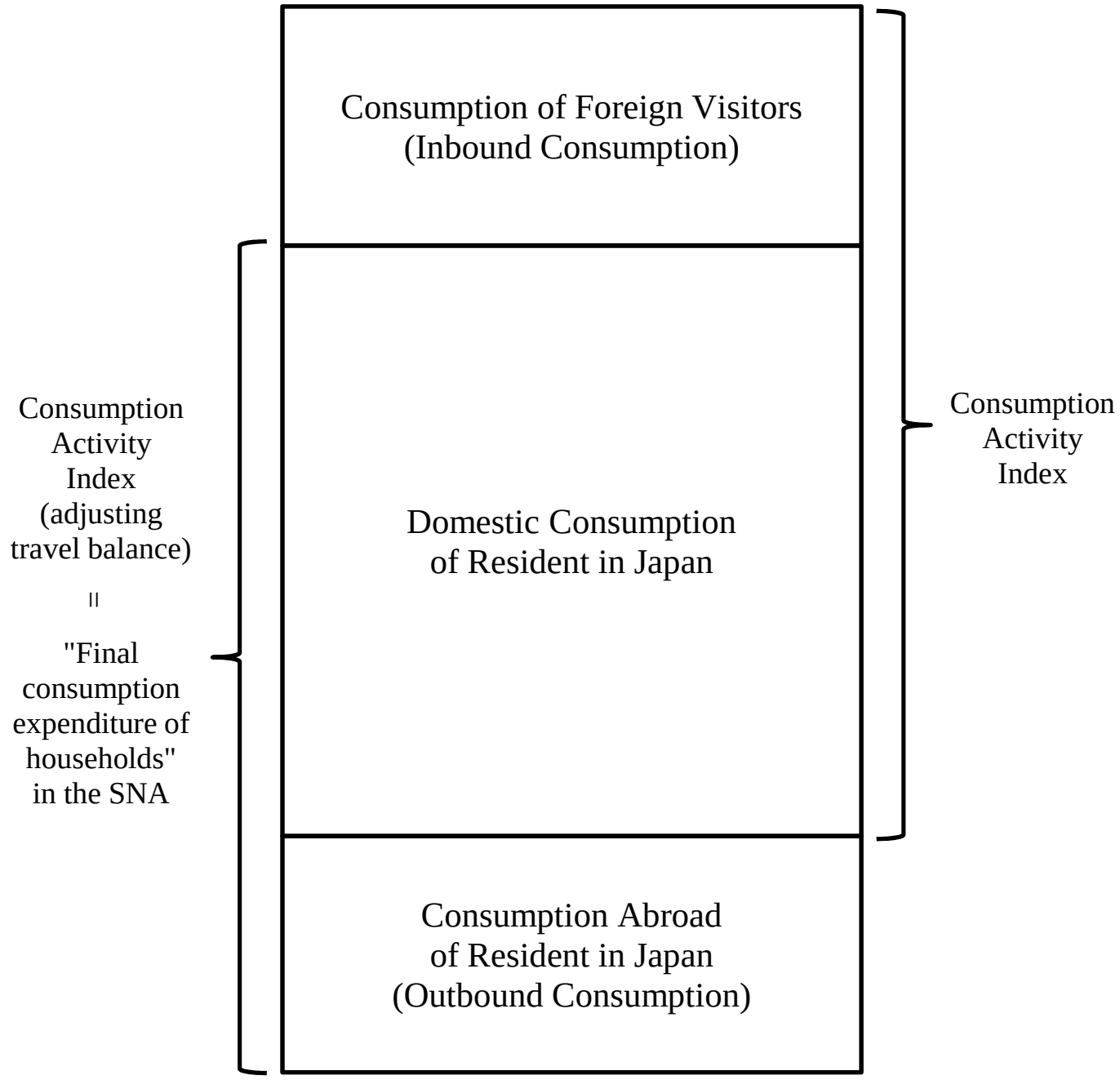
Cabinet Office 2016, "Minutes of the 2016 4th Council on Economic and Fiscal Policy (available in Japanese only)."

Cabinet Office, Statistical Commission 2016, "2014 Report on the Statistics Act (available in Japanese only)."

Bank of Japan, Research and Statistics Department 2009, "Explanation of *Indices of Aggregated Sales*"
https://www.boj.or.jp/statistics/outline/exp/exhan.htm.; available in Japanese only

Chart 1

Definition of Private Consumption



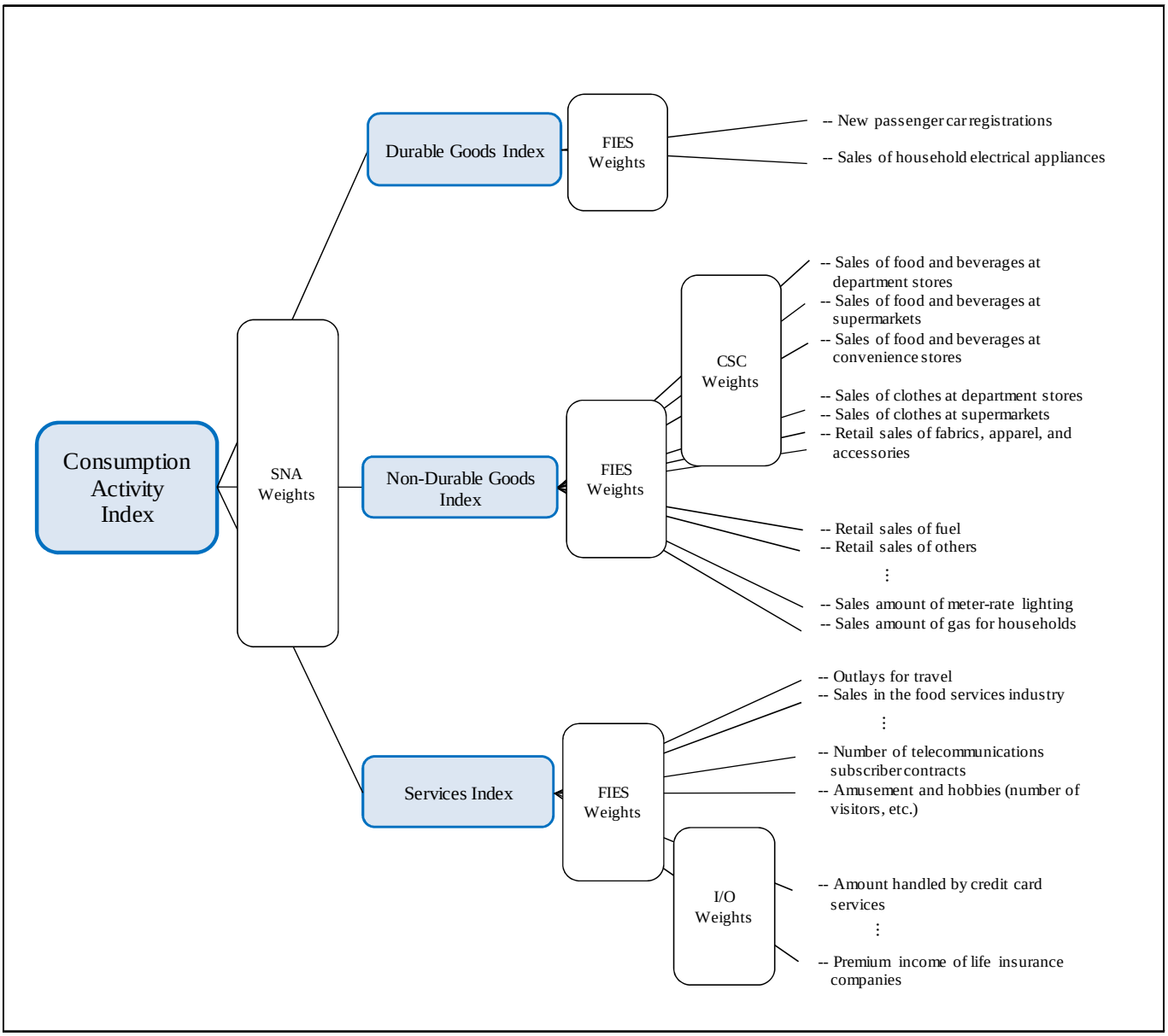
Notes: 1. "Final consumption expenditure of households" in the System of National Accounts (SNA) excluding imputed rent corresponds to the Consumption Activity Index. In the analyses in this paper, thus, the Consumption Activity Index is compared with "consumption of households excluding imputed rent" in the SNA.

2. "SNA-based private consumption" reported in the news is calculated as the sum of "final consumption expenditure of private non-profit institutions serving households" and "final consumption expenditure of households."

Source: Cabinet Office.

Chart 2

Structure of Consumption Activity Index



Notes: 1. System of National Accounts (SNA) weights are those of each consumption type in nominal domestic final consumption expenditure of households in the SNA.
2. FIES weights are those of each good/service in yearly total consumption expenditures in the Family Income and Expenditure Survey.
3. CSC weights are those of each good in yearly sales of each business category in the Current Survey of Commerce.
4. I/O weights are those of each service in the household consumption expenditure in the Input-Output Tables.
5. SNA weights, FIES weights, and CSC weights are those of CY 2010. I/O weights are those of CY 2011.
6. CSC weights are used for integrating some series classified as non-durable goods. I/O weights are used for integrating some series classified as services.

Goods Data

Item		Classification	Adopted Series	Source
Passenger cars	Passenger cars excluding small cars	Durable goods	New passenger car registrations (excluding small cars)	Japan Automobile Dealers Association, "Domestic Sales of Automobiles"
	Small cars with engine sizes of 660cc or less		New passenger car registrations (including small cars with engine sizes of 660cc or less)	Japan Light Motor Vehicle and Motorcycle Association "Sales of Light Motor Vehicles"
Household electrical appliances			Retail sales (machinery and equipment)	"Current Survey of Commerce" (METI)
Food and beverages		Non-durable goods	Retail sales of food and beverages at department stores, supermarkets and convenience stores	"Current Survey of Commerce" (METI)
Clothes			Retail sales of clothes at department stores and supermarkets	
			Retail sales (fabrics, apparel, and accessories)	
Fuel			Retail sales (fuel)	
Drugs, cosmetics, etc.			Retail sales (others)	
Electricity			Sales amount of meter-rate lighting	Agency for Natural Resources and Energy
Gas			Sales amount of gas for households	The Japan Gas Association
* Water			Amount of distributed water	Sapporo City, Sendai City, Tokyo, Nagoya City, Osaka City, Hiroshima City, Fukuoka City
* Newspapers			Newspaper circulations	Japan Audit Bureau of Circulations
* Books and magazines			Circulation of weekly magazines, monthly magazines, and books	Media Research Center, The All Japan Magazine and Book Publisher's and Editor's Association
Game software			Sales of game software	"Current Survey of Selected Service Industries" (METI)
Automobile maintenance			Number of automobiles owned	"Monthly Report on Number of Automobiles Owned" (MLIT)

Note: Items with * show the adopted data for the Indices of Tertiary Industry Activity (ITA) series used for calculating the Consumption Activity Index.

Services Data

Item		Adopted Series	Source
Food services		Sales in the food services industry	Japan Food Service Association "Market Trend Survey of the Food Services Industry"
Travel services		Outlays for travel (domestic and overseas)	Japan Tourism Agency "Major Travel Agents' Revenue"
* Medical and other health care services		Points of "medical care" and "dental care" of the "Medical service fee payment definite status"	Social Insurance Medical Fee Payment Fund, National Health Insurance Association
* Care services		Number of recipients of in-home/in-facility care services	"Monthly Report on Survey of Long-term Care Benefit Expenditures" (MHLW)
* Communications	Regional and long-distance telecommunications	Number of fixed-line data and voice communications subscriber contracts	"Official Announcement of Quarterly Data on the Number of Telecommunications Service Subscriptions and Market Share" (MIC)
	Internet service provider	Number of fixed-line broadband subscriber contracts	
	Mobile telecommunications	Number of mobile communications subscriber contracts	
* Transport	Railway	Number of passengers of JR/private railway	"Monthly Report of Land, Infrastructure and Transportation Economics" (MLIT)
	Bus	Number of bus passengers (Tokyo)	
	Taxi	Number of taxi passengers (Tokyo)	
	Air	Number of air passengers	
* Postal services		Domestic mail, international mail	Japan Post
* Services for amusement and hobbies	Cinemas	Number of movie theater visitors (until Dec. 2014)	"Current Survey of Selected Service Industries" (METI)
		Number of visitors to major movie theaters	"Nikkan Kogyo Tsushin" (Kogyo Tsushinsha)
	Professional sports companies	Number of attendees at sumo matches	Nihon Sumo Kyokai
		Number of attendees at boxing matches	Japan Boxing Commission
		Number of attendees at professional baseball regular seasons, the All-Star game and the Japan Series	Nippon Professional Baseball Organization
		Number of attendees at J. League matches	Japan Professional Football League
		The number of people in the gallery of the official tournaments of men's/ladies' professional golf	The Golf Tournament Promotion Association of Japan Inc.
	Race track operations	Ticket sales at bicycle races	Japan Keirin Association
		Ticket sales at horse races conducted by the Japan Racing Association	Japan Racing Association, The National Association of Racing
		Sales of motorcar races	Japan Motorcycle Racing Organization
		Ticket sales at motorboat races	All Japan Motorboat Racing Association
	Sports facilities	Number of users of golf courses	"Current Survey of Selected Service Industries" (METI)
		Number of users of golf ranges	
		Number of users of bowling alleys	
		Number of fitness club members	
	Amusement parks and theme parks	Number of visitors to amusement parks and theme parks	
	Pachinko parlors	Sales at "Pachinko" parlors	
* Accommodations	Japanese style hotels	Number of stays in Japanese-style hotels	"Statistical Survey on Overnight Travel" (Japan Tourism Agency)
	Hotels	Total number of stays in hotels	
* Supplementary tutorial schools		Number of students at supplementary tutorial schools	"Current Survey of Selected Service Industries" (METI)
* Ceremonial occasions		Number of funeral services handled, number of services handled at wedding ceremony halls	
* Public broadcasting		Number of NHK reception contracts	NHK
* Automobile parking		Number of automobiles owned	"Monthly Report on Number of Automobiles Owned" (MLIT)
* Money lending		Number of outstanding accounts at month-end	"Monthly Survey" (Japan Financial Services Association)
* Credit card		Amount handled by credit card services	"Current Survey of Selected Service Industries" (METI)
* Life insurance		Premium income of life insurance companies	The Life Insurance Association of Japan
* Non-life insurance		Direct net premium of non-life insurance companies	The General Insurance Association of Japan

Note: Items with * show the adopted data for the ITA series used for calculating the Consumption Activity Index.

Price Index for Converting Nominal Index from/to Real Index

Item	Price Index for Converting Nominal Index to Real Index
Food and beverages	Food (excluding meals outside the home)
Clothes	Clothes and footwear, and personal effects (excluding wrist watches)
Household electrical appliances	Durable goods assisting housework, heating and cooling appliances, lighting apparatus, fluorescent lamps, bathroom scales, thermometers, sphygmomanometers, telephone set, cellular phones, TV sets, mobile audio players, electronic dictionaries, video recorders, personal computers, PC printers, cameras, video cameras, TV games (stationary and portable), game software, recordable disc media, memory cards, dry batteries, and electric shavers
Food services	Eating out
Travel services	Package tours to overseas, package tours (domestic) made by hotel charges, railway fares, and airplane fares
Game software	Game software * Before 2009, CPI less imputed rent
Fuel	Gasoline, liquefied propane, and kerosene
Drugs, cosmetics, etc.	CPI for goods (excluding gasoline)
Medical and other health care services	Revision rate of medical fee

Item		Price Index for Converting Real Index to Nominal Index
Passenger cars		Automobiles
Electricity		Electricity
Gas		Gas
Water		Water charges
Care services		Charges for nursing care
Communications	Regional and long-distance telecommunications	Telephone charges
	Internet service provider	Internet connection charges
	Mobile telecommunications	Mobile telephone charges
Transport	Railway	Railway fares
	Bus	Fixed route bus fares, and expressway bus fares
	Taxi	Taxi fares
	Air	Airplane fares
Postal services		Postcards, and letters
Services for amusement and hobbies		Admission and game charges
Newspaper		Newspapers
Books and magazines		Books, and magazines
Accommodations		Hotel charges
Supplementary tutorial schools		Tutorial fees
Ceremonial occasions		CPI less imputed rent
Automobile maintenance		Regular inspection, and puncture repairs
Public broadcasting		Charges for NHK TV license
Automobile parking		Charges for garage rental, and charges for parking
Money lending and credit card		Domestic money transmission and receipt, and account services * Services Producer Price Index (SPPI)
Life insurance		CPI less imputed rent
Non-life insurance		Property and casualty insurance services * Services Producer Price Index (SPPI)

Notes: 1. Real values for car registrations, ITA series, etc. are converted to nominal values using price indices in the table.
2. Without notes, price indices are those in the CPI.

Sources: Ministry of Internal Affairs and Communications; Bank of Japan.

Additional Series for Consumption Activity Index Plus

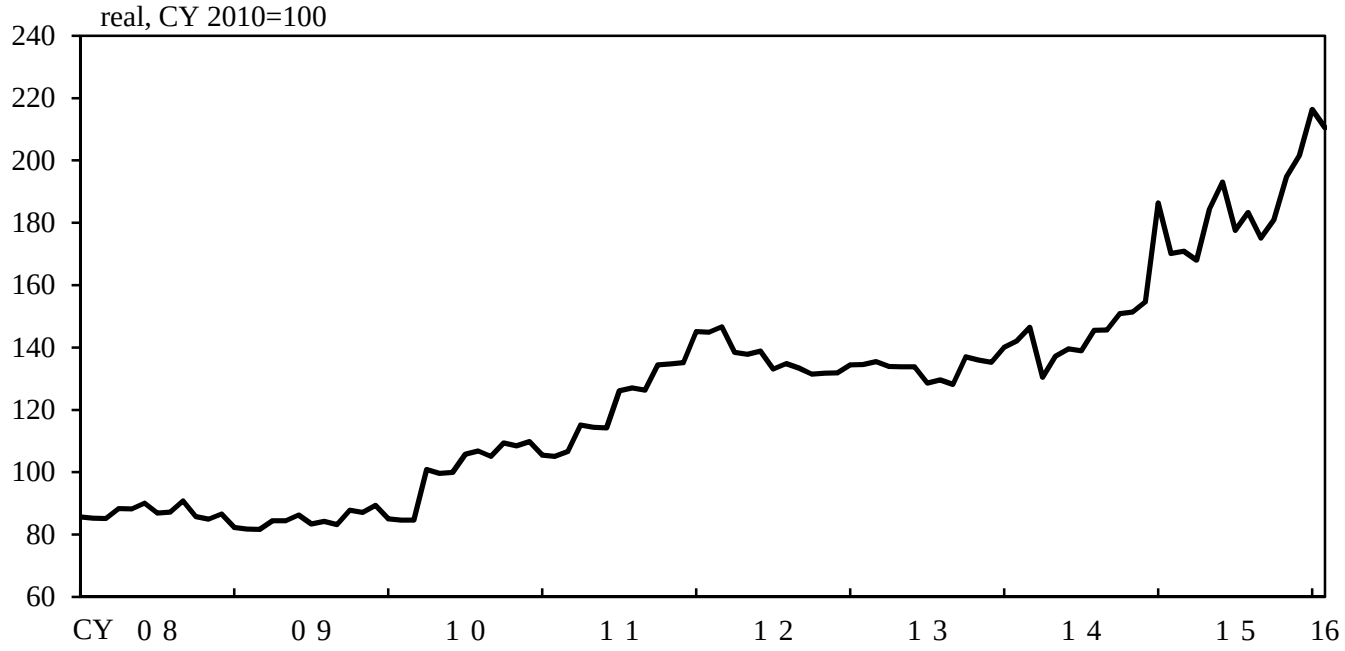
(1) Additional Item for Consumption Activity Index Plus

Item	Adopted Series	Source	Start Date
* Digital contents delivery services	Sales of digital contents delivery services	"Current Survey of Selected Service Industries" (METI)	Jan. 2008

(2) Price Index for Converting Real Index to Nominal Index

Item	Price Index for Converting Real Index to Nominal Index
* Digital contents delivery services	Services incidental to the internet in "Services Producer Price Index" (BOJ)

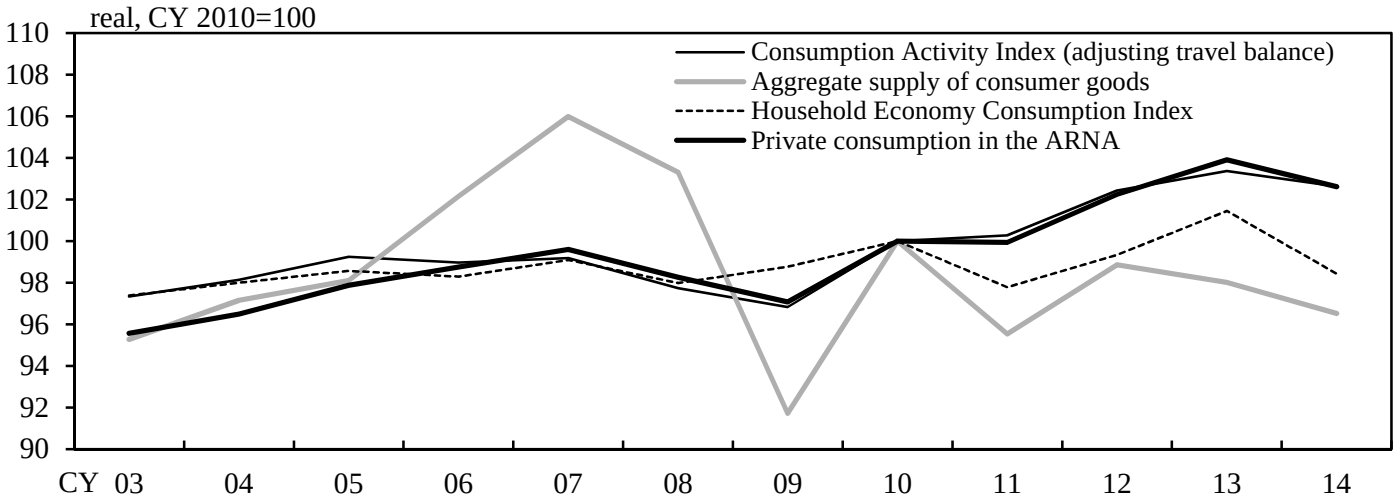
(3) Recent Developments of Added Series (Digital Contents Delivery Services)



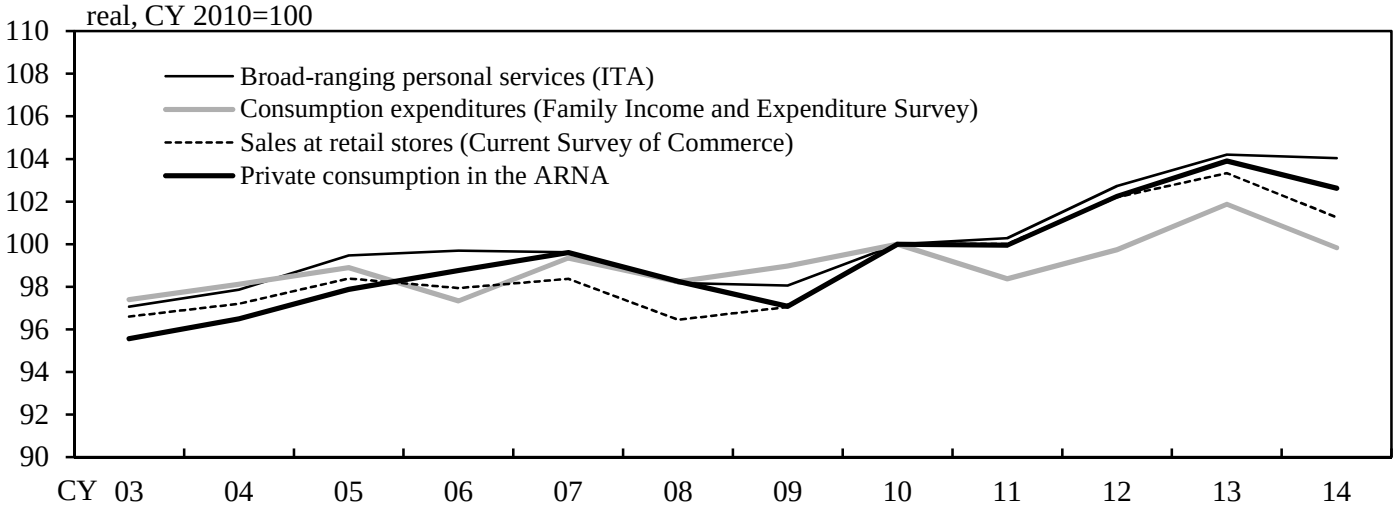
Note: Items with * show the adopted data for the ITA series used for calculating the Consumption Activity Index.
Sources: Ministry of Economy, Trade and Industry; Bank of Japan.

Comparison with Private Consumption in Annual Report on National Accounts (ARNA)

(1) Consumption Activity Index, etc.



(2) Broad-ranging Personal Services (ITA), etc.



(3) RMSE, MAE, and Correlation Coefficients

	Consumption Activity Index	Sales at retail stores (Current Survey of Commerce)	Broad-ranging personal services (ITA)	Aggregate supply of consumer goods	Consumption expenditures (Family Income and Expenditure Survey)	Household Economy Consumption Index
RMSE	0.85	0.89	0.95	4.18	1.67	1.96
MAE	0.60	0.68	0.75	3.43	1.41	1.56
Correlation coefficients	0.95	0.94	0.91	0.11	0.76	0.41

(Sample: CY 2003-CY 2014)

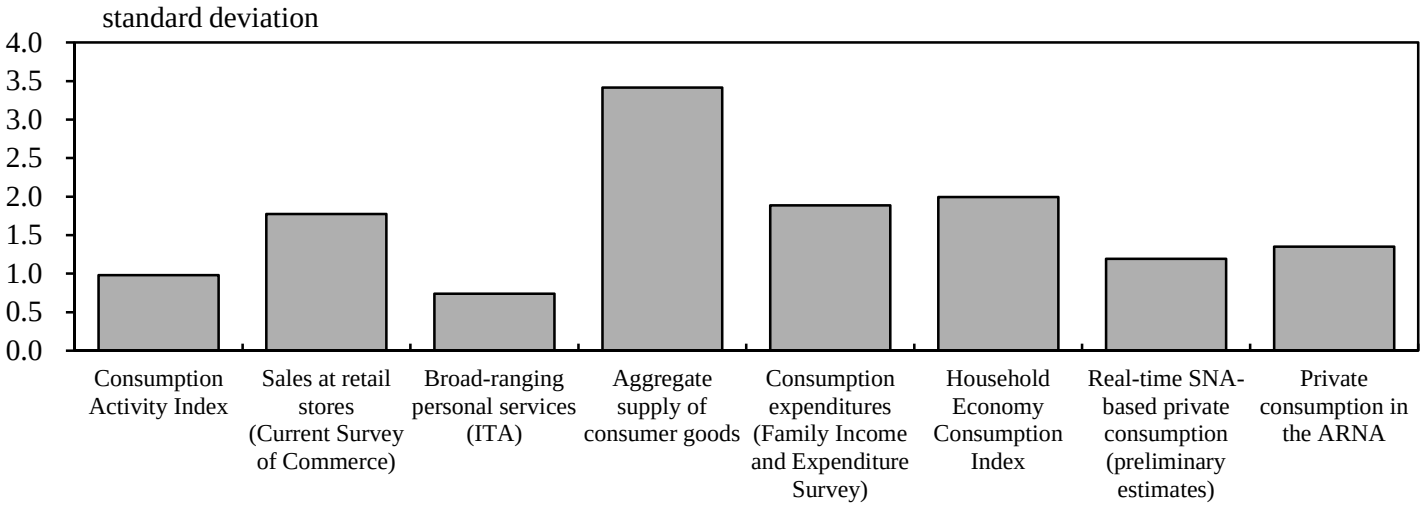
Notes: 1. Private consumption in the ARNA is consumption of households excluding imputed rent.
2. The Household Economy Consumption Index (developed by the Ministry of Internal Affairs and Communications) is calculated combining consumption expenditures based on the Family Income and Expenditure Survey and those based on the Survey of Household Economy.
3. The consumption expenditures (Family Income and Expenditure Survey) and the Household Economy Consumption Index are converted into the aggregate private consumption using the estimates for the number of households.
4. RMSE (Root Mean Squared Error), MAE (Mean Absolute Error), and correlation coefficients are calculated in relation to the private consumption in the ARNA.

Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Monthly/Quarterly Fluctuations

(1) Monthly Fluctuations

(2) Quarterly Fluctuations

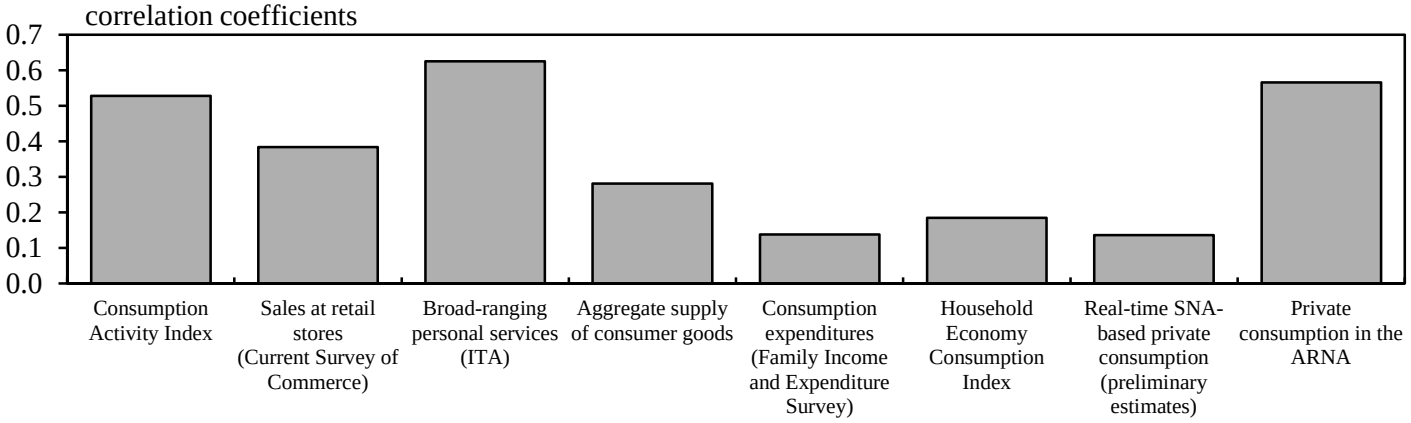


Notes: 1. Standard deviations are calculated using seasonally adjusted monthly/quarterly percent changes. Sample period in (1) is February 2003-December 2015. Sample period in (2) is 2003/Q2-2015/Q4 except for the private consumption in the ARNA. Sample period for the private consumption in the ARNA is 2003/Q2-2014/Q4.
2. Figures for the Consumption Activity Index adjust travel balance.
3. Figures for the real-time SNA-based private consumption (preliminary estimates) are calculated using the level for the private consumption in the ARNA in 2010/Q1 and the real-time quarterly percent changes in the SNA-based private consumption (1st preliminary estimates) in each quarter.

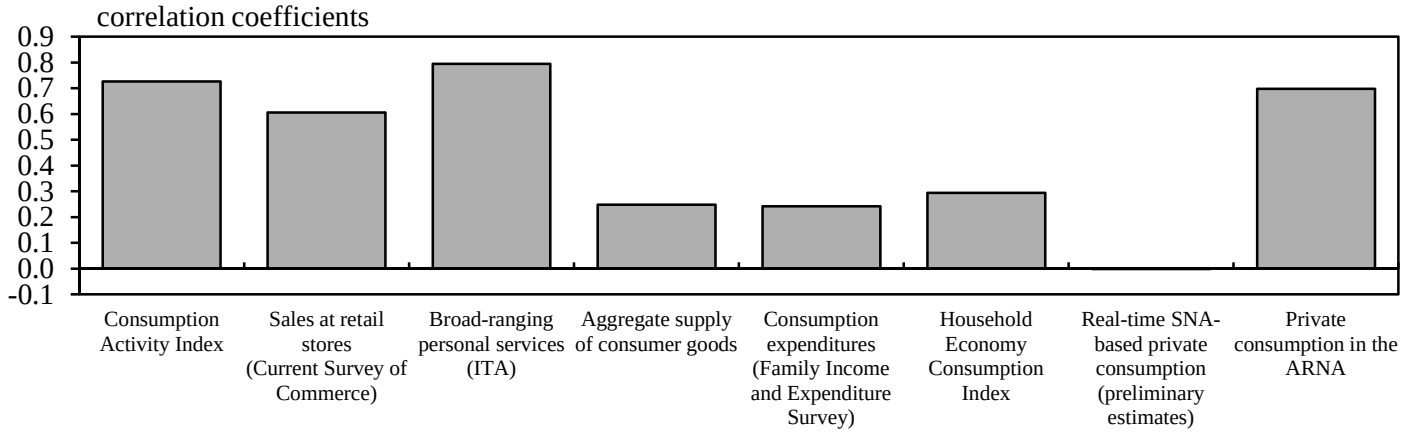
Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Correlation with Confidence Indicators

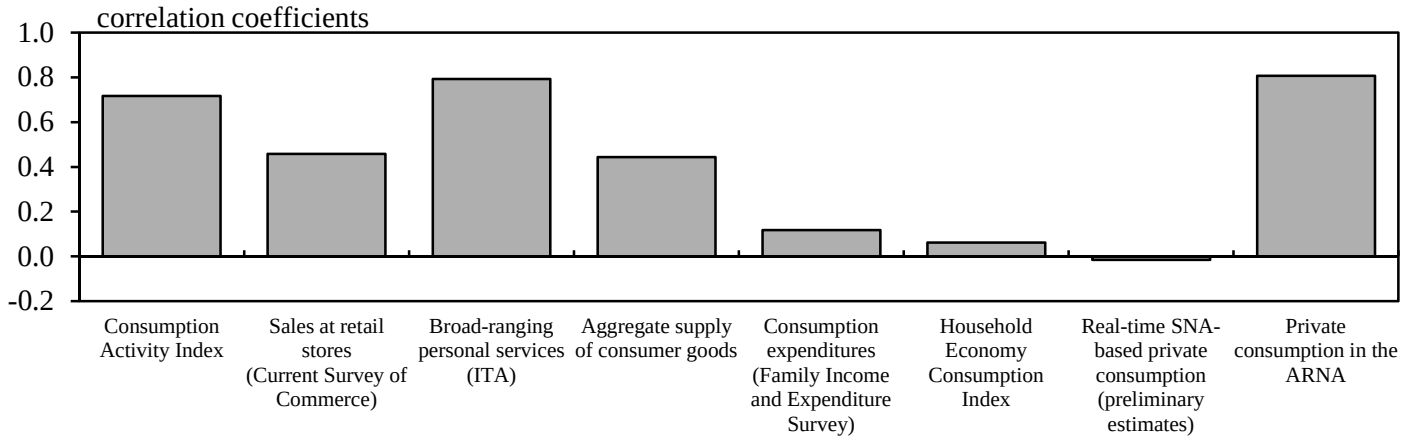
(1) Correlation with Consumer Confidence Index (Consumer Confidence Survey)



(2) Correlation with DI for Judgement of Current Conditions (Household Activity, Economy Watchers Survey)



(3) Correlation with Business Conditions of Industries Related to Private Consumption (*Tankan*)



Notes: 1. Correlation coefficients in (1) and (2) are calculated using monthly data except for the SNA-based private consumption. (sample period: January 2003-December 2015). Correlation coefficients for the SNA-based private consumption are calculated using quarterly data (sample period: <real-time SNA-based private consumption (preliminary estimates)> 2003/Q1-2015/Q4, <private consumption in the ARNA>2003/Q1-2014/Q4). Figures in (3) are calculated using quarterly data (sample period: <except for private consumption in the ARNA>2004/Q1-2015/Q4, <private consumption in the ARNA>2004/Q1-2014/Q4).

2. Figures for the real-time SNA-based private consumption (preliminary estimates) are calculated using the level for the private consumption in the ARNA 2010/Q1 and the real-time quarterly percent changes in the SNA-based private consumption (1st preliminary estimates) in each quarter.

3. In calculating correlation coefficients, confidence indicators are deviations from the average in the sample period. Consumption indicators are percent deviations from the linear trends of each indicator.

Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

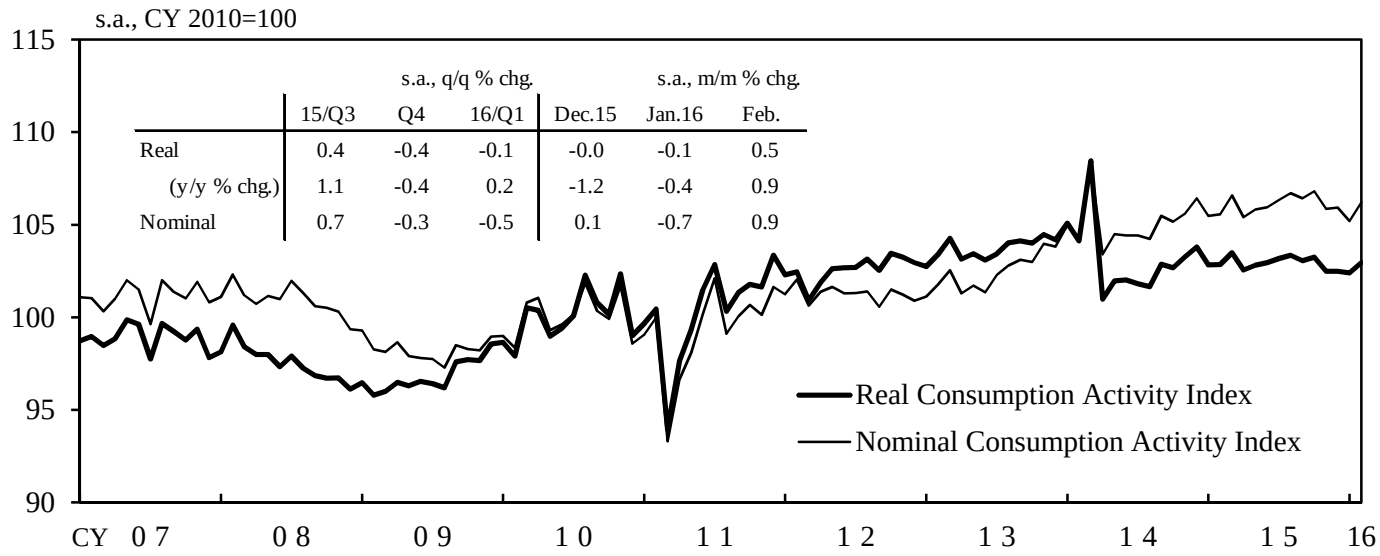
Chart 10

Overall Assessment

	Consumption Activity Index	Broad-ranging personal services (ITA)	Sales at retail stores (Current Survey of Commerce)	Consumption expenditures (Family Income and Expenditure Survey)	Household Economy Consumption Index	Aggregate supply of consumer goods
Correlation with private consumption in the ARNA	○	○	○	×	×	×
Small short-run fluctuations	○	○	△	×	×	×
Correlation with confidence indicators	○	○	△	×	×	×
Coverage	○	○	△	○	○	△
Not using demand side statistics	○	×	○	×	×	○
Timeliness	○	△	○	○	△	△
Adjustment for inbound/outbound consumption	○	×	×	○	○	×
Adjustment for individual/corporate consumption	○	△	△	○	○	△
Overall assessment	○	△	△	×	×	×

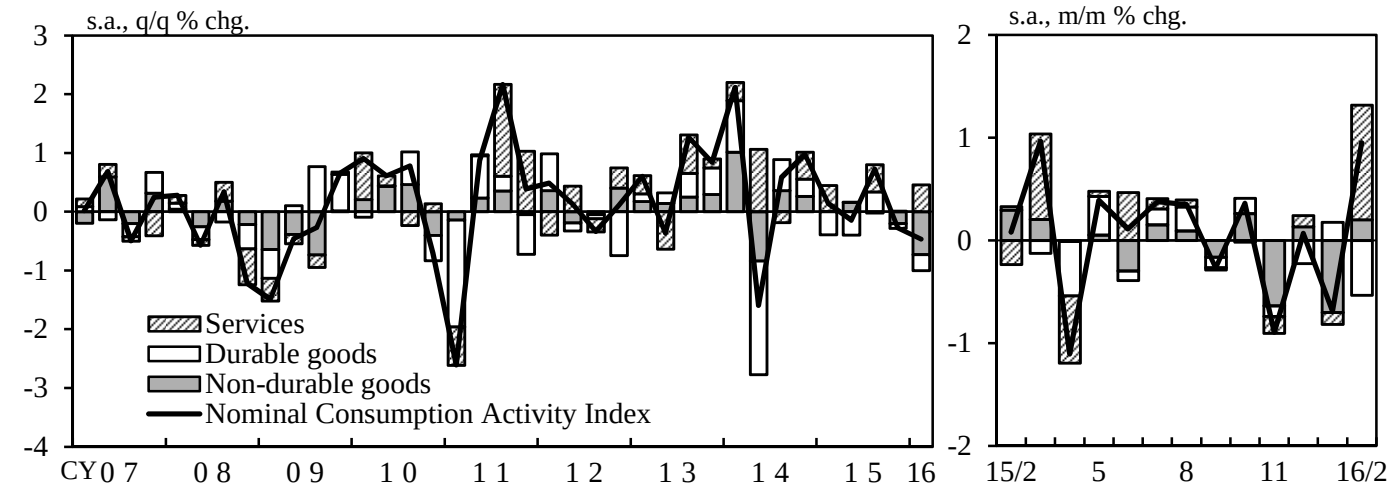
Recent Developments in Consumption Activity Index

(1) Consumption Activity Index

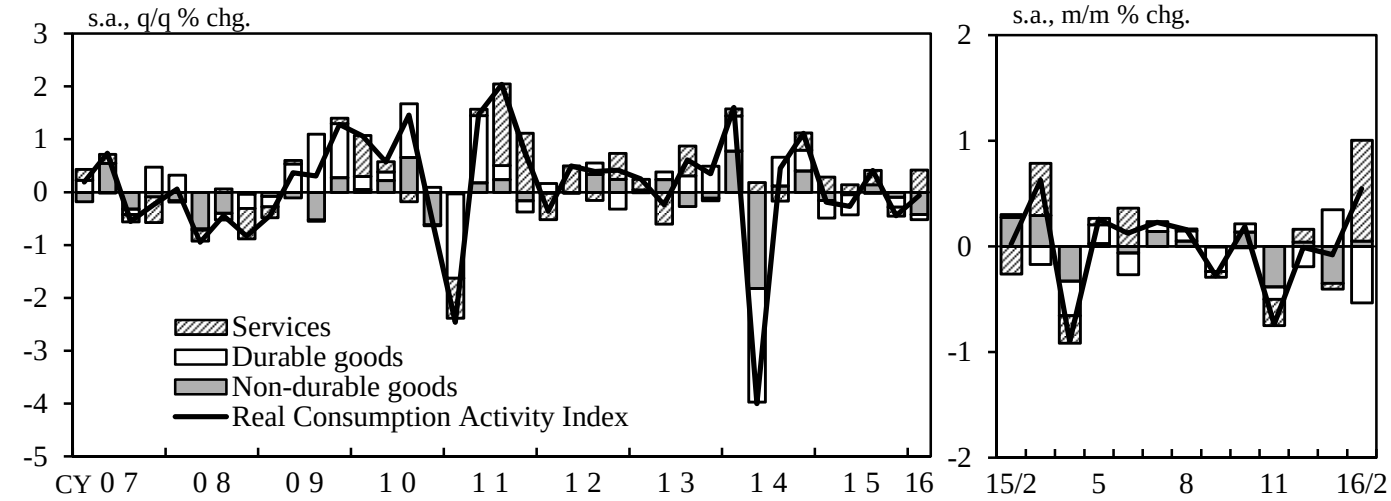


	s.a., q/q % chg.			s.a., m/m % chg.		
	15/Q3	Q4	16/Q1	Dec.15	Jan.16	Feb.
Real	0.4	-0.4	-0.1	-0.0	-0.1	0.5
(y/y % chg.)	1.1	-0.4	0.2	-1.2	-0.4	0.9
Nominal	0.7	-0.3	-0.5	0.1	-0.7	0.9

(2) Nominal Consumption Activity Index



(3) Real Consumption Activity Index

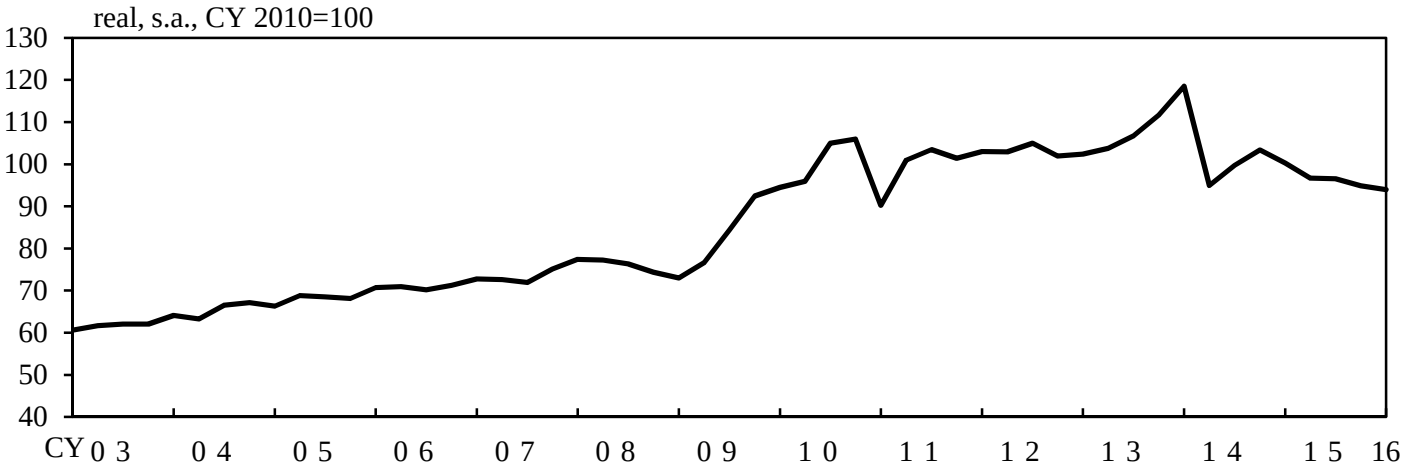


Note: Figures for 2016/Q1 are January-February averages.

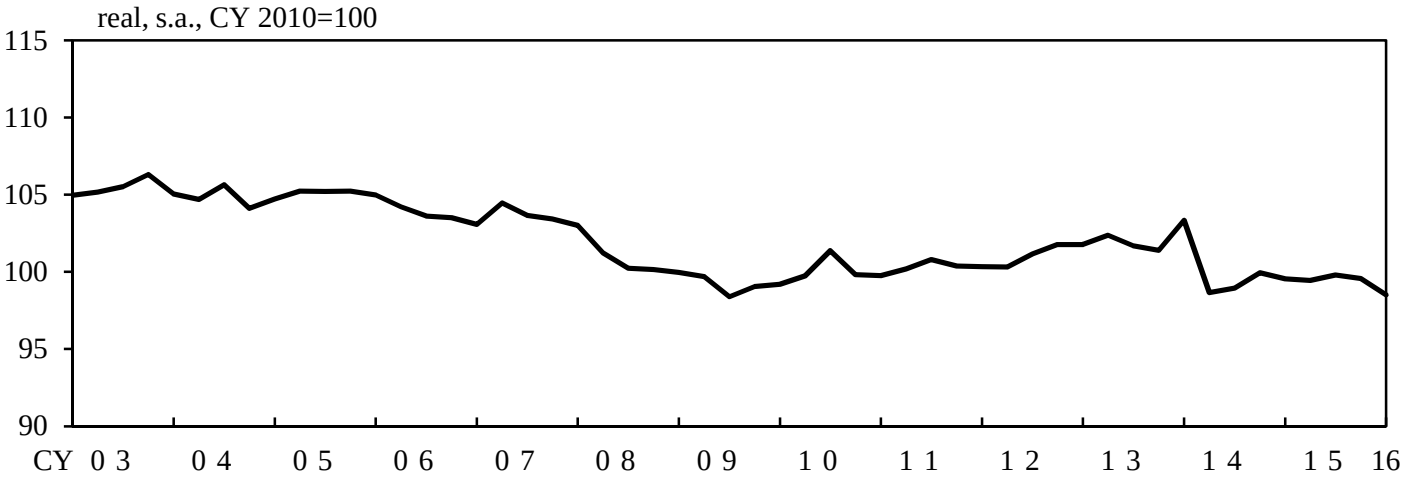
Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry; Ministry of Internal Affairs and Communications, etc.

Consumption Activity Index by Type

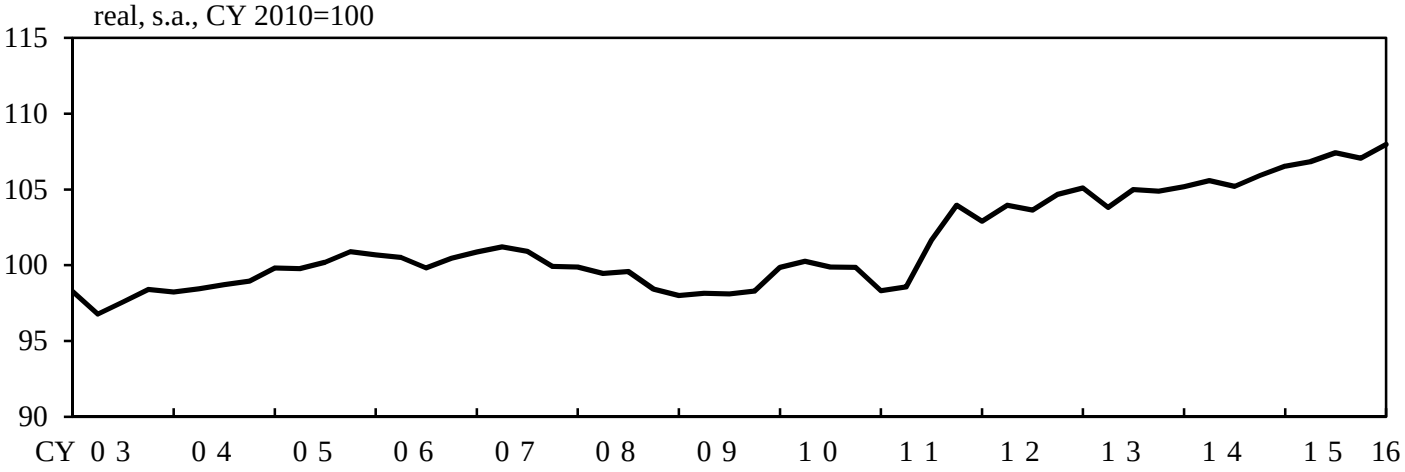
(1) Durable Goods



(2) Non-Durable Goods



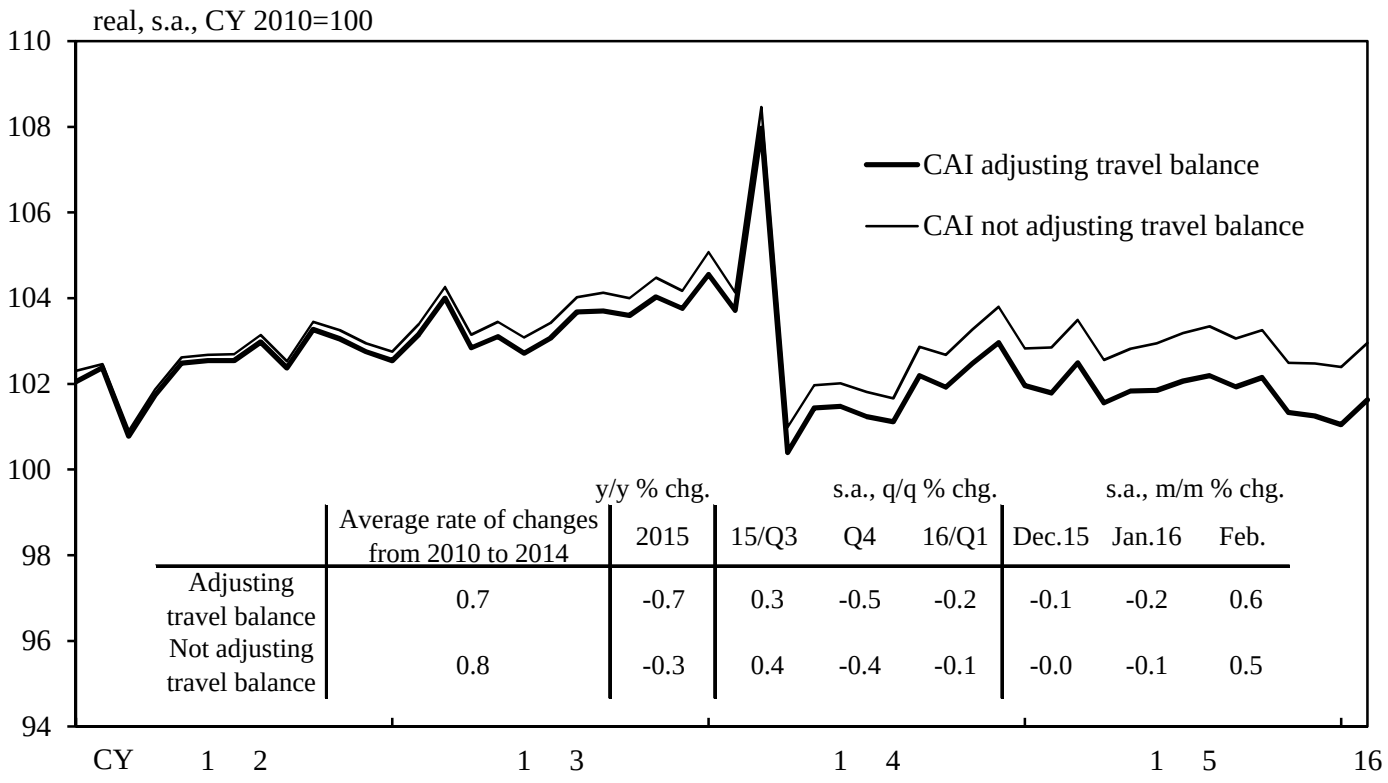
(3) Services



Notes: 1. Non-durable goods include goods classified as "semi-durable goods" in the SNA.
2. Figures for 2016/Q1 are January-February averages.
Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Chart 13

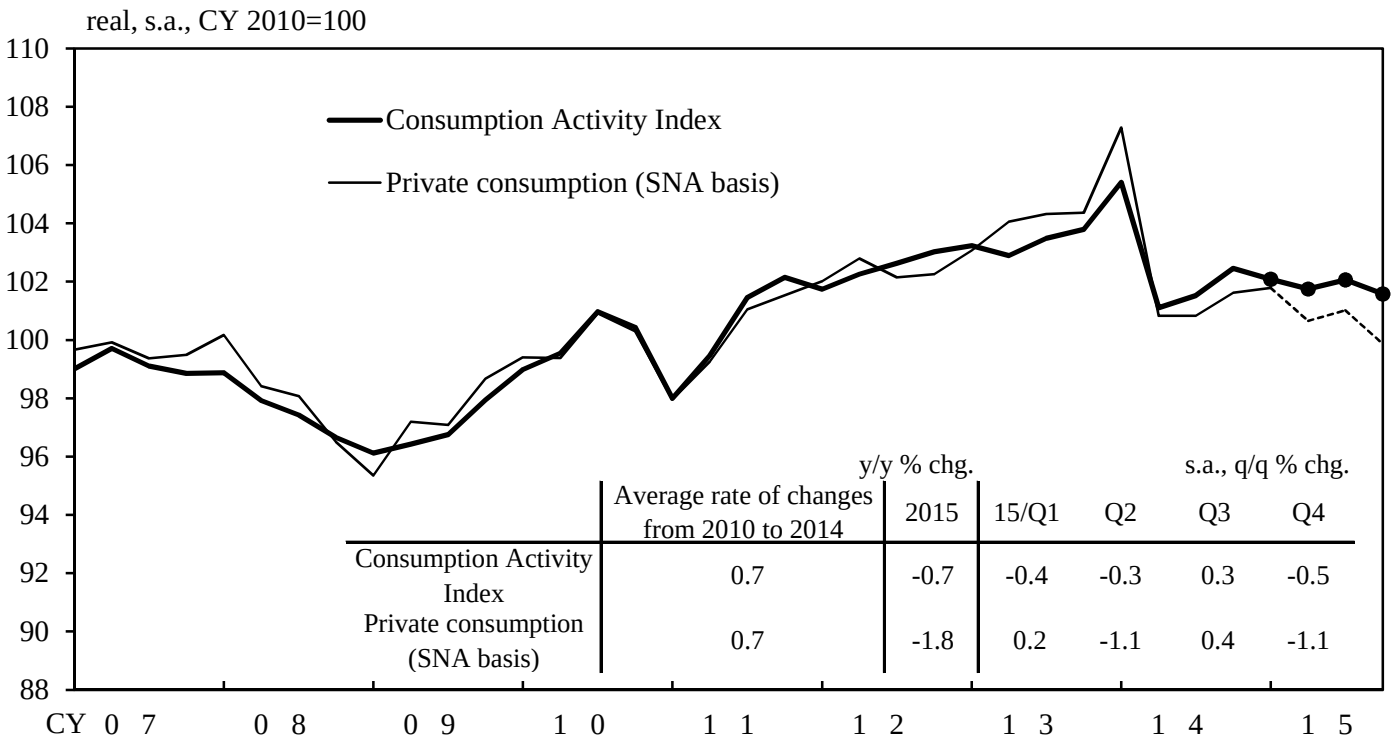
Effects of Inbound Consumption



	Average rate of changes from 2010 to 2014	y/y % chg. 2015	s.a., q/q % chg. 15/Q3	Q4	16/Q1	s.a., m/m % chg. Dec.15	Jan.16	Feb.
Adjusting travel balance	0.7	-0.7	0.3	-0.5	-0.2	-0.1	-0.2	0.6
Not adjusting travel balance	0.8	-0.3	0.4	-0.4	-0.1	-0.0	-0.1	0.5

Note: Figures for 2016/Q1 are January-February averages.
Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Comparison with SNA-based Private Consumption

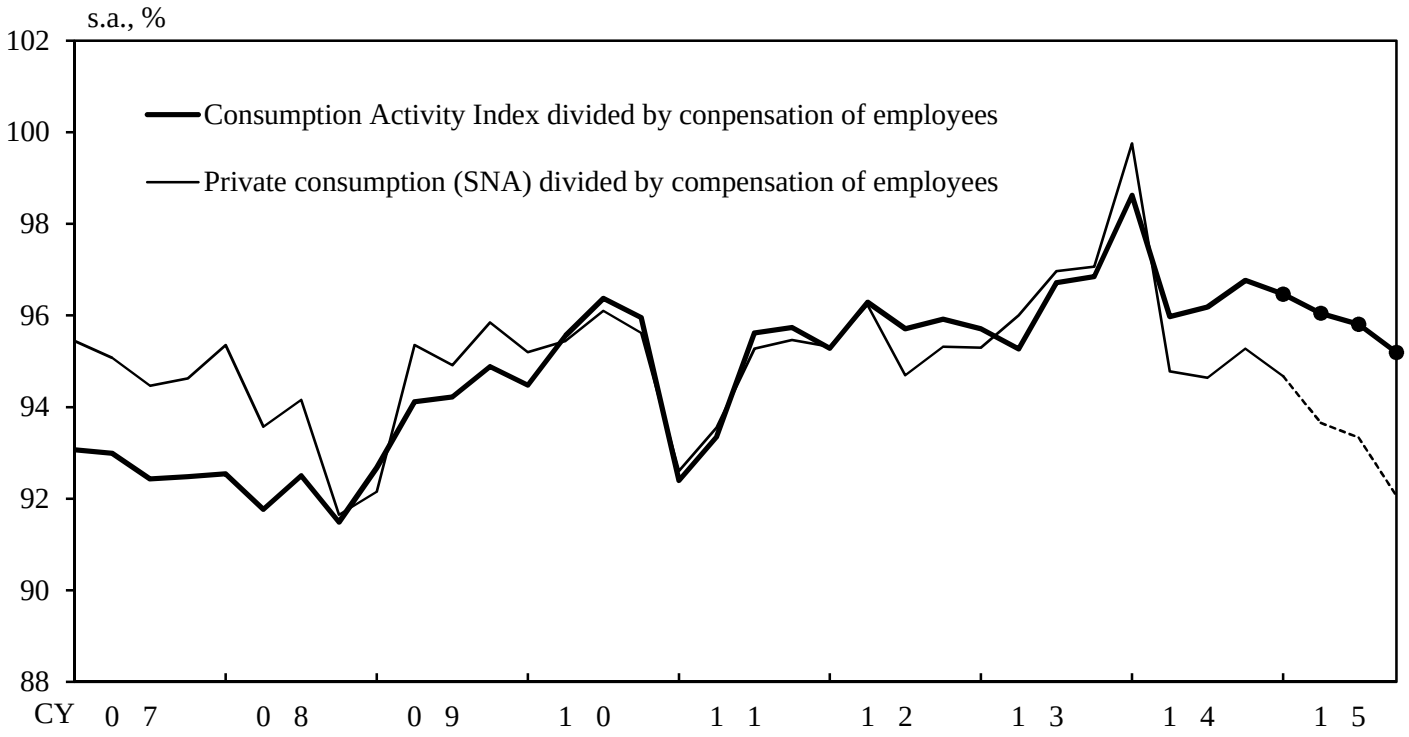


	Average rate of changes from 2010 to 2014	y/y % chg. 2015	s.a., q/q % chg. 15/Q1	Q2	Q3	Q4
Consumption Activity Index	0.7	-0.7	-0.4	-0.3	0.3	-0.5
Private consumption (SNA basis)	0.7	-1.8	0.2	-1.1	0.4	-1.1

Notes: 1. Figures for the Consumption Activity Index adjust travel balance.
Figures for the private consumption (SNA basis) are those of consumption of households excluding imputed rent.
2. The broken part of the line shows private consumption based on preliminary quarterly estimates (SNA basis).

Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

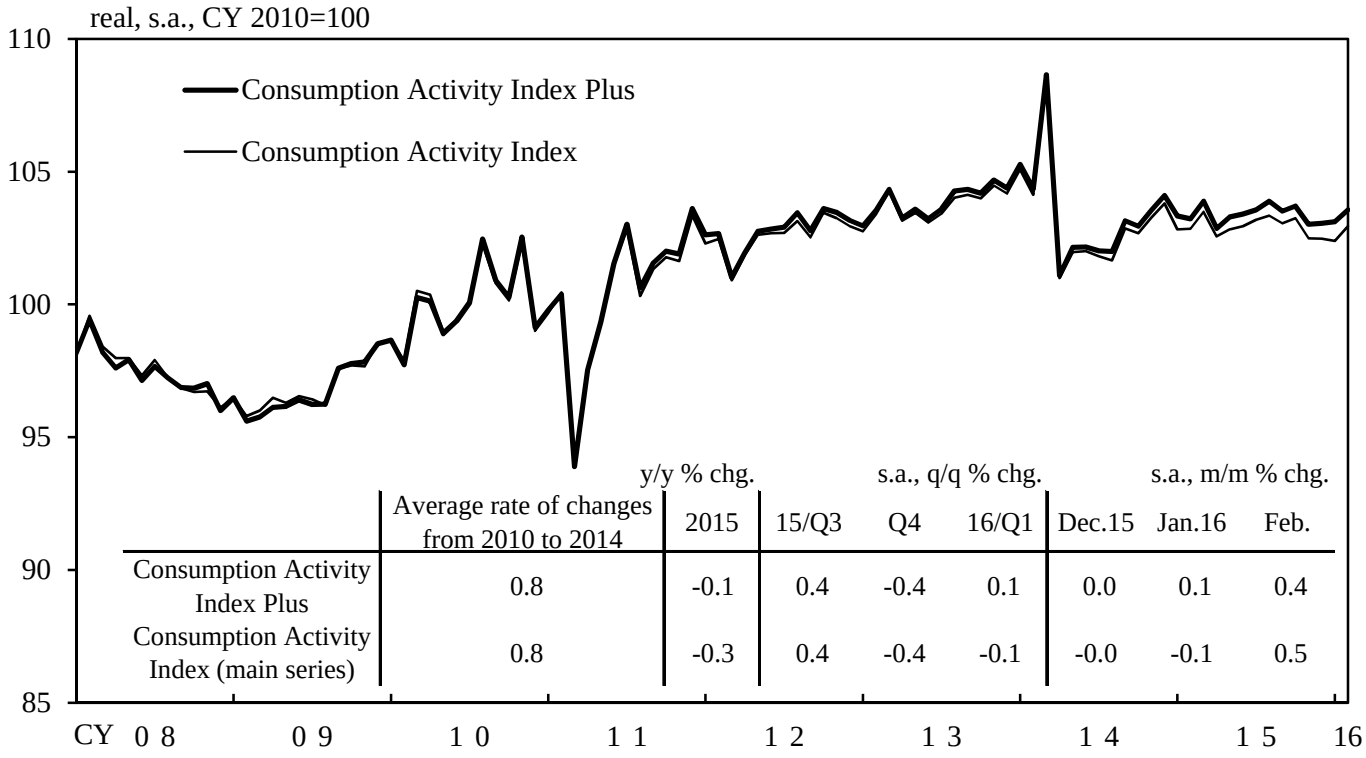
Average Propensity to Consume



Notes: 1. For the calculation, the Consumption Activity Index (nominal index, adjusting travel balance) is converted into nominal values using SNA-based private consumption in 2010.
2. Private consumption is consumption of households excluding imputed rent.
3. The broken part of the line shows "private consumption (SNA) divided by compensation of employees" based on preliminary quarterly estimates (SNA basis).

Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Consumption Activity Index Plus

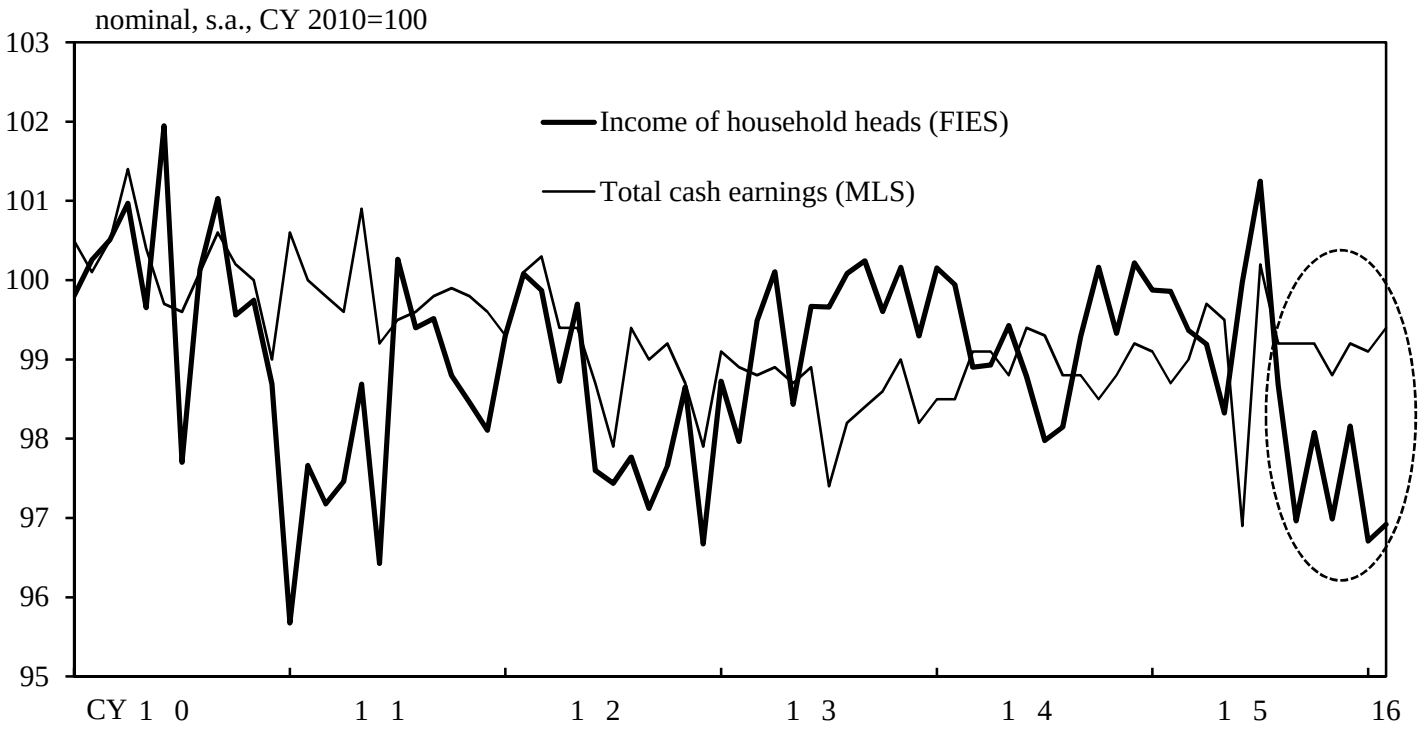


	Average rate of changes from 2010 to 2014	y/y % chg. 2015	s.a., q/q % chg. 15/Q3	Q4	16/Q1	s.a., m/m % chg. Dec.15	Jan.16	Feb.
Consumption Activity Index Plus	0.8	-0.1	0.4	-0.4	0.1	0.0	0.1	0.4
Consumption Activity Index (main series)	0.8	-0.3	0.4	-0.4	-0.1	-0.0	-0.1	0.5

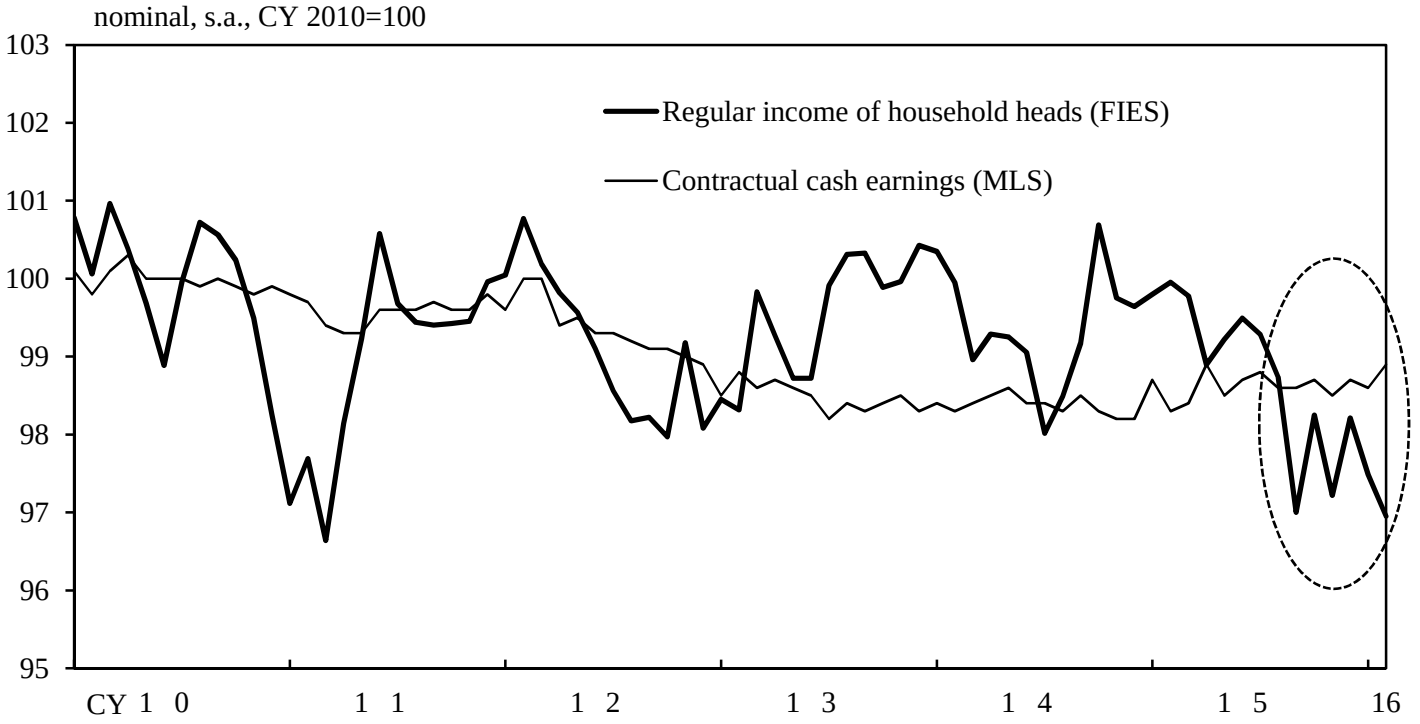
Note: Figures for 2016/Q1 are January-February averages.
Sources: Cabinet Office; Bank of Japan; Ministry of Economy, Trade and Industry;
Ministry of Internal Affairs and Communications, etc.

Income Comparison between FIES and MLS

(1) Income of Household Heads (FIES) and Total Cash Earnings (MLS)



(2) Regular Income of Household Heads (FIES) and Contractual Cash Earnings (MLS)



Note: FIES stands for Family Income and Expenditure Survey. MLS stands for Monthly Labour Survey.

Sources: Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare.