Methodology of Compiling Preliminary Quarterly GDP

CY2011 Benchmark Edition

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Department of National Accounts,
Economic and Social Research Institute,
Cabinet Office

Preface

This guide introduces the compiling methodology of the preliminary quarterly GDP on expenditure side and related figures (hereafter abbreviated as QE) in the Japanese National Accounts (hereafter JSNA). In the JSNA, Economic and Social Research Institute of Cabinet Office releases QE twice per quarter. The first preliminary estimates (hereafter, first QE) is released about 45 days after the end of the quarter, while the second preliminary estimates (hereafter, second QE) is released about 70 days after the end of the quarter.

The previous version of the guide on the estimation methodology including source statistics for QE was published as "Methodology of Compiling Preliminary Quarterly GDP -CY2005 Benchmark Edition" (only in Japanese). As the latest quinquennial benchmark year revision of the JSNA (i.e. Benchmark Year Revision of 2011, hereafter BYR2011) was conducted in December 2016, we have revised the guide and publish it in English in addition to Japanese.

In the BYR2011, besides incorporating several large-scale detailed source statistics such as the latest *Input-Output Table for 2011* (published in June 2015), the improvement of estimation methods and the changes in concepts and definitions were also carried out. Moreover, the implementation of the 2008SNA, the latest international standard on national accounts adopted under agreement by member countries of the United Nations in February 2009, is the integral part of the BYR2011. The 2008SNA recommends a variety of changes and clarifications of concepts and definitions from its predecessor, 1993SNA, reflecting the development in economic and financial environments after the 1990s, of which the most notable example is to record the expenditures on research and development (R&D) as gross fixed capital formation.

Based on these comprehensive revision, the compilation method of QE has also been upgraded, including the introduction of the methods for estimating new items (e.g. R&D), and the change in source statistics used for extrapolation from the most recent Annual Estimates, especially in a broad range of service sector, to improve estimation accuracy as much as possible.

We hope that this renewed guide will be used widely to help the statistical users deepen the understanding on Japanese of National Accounts.

I. Supply-Side Estimation

1. Basic Scheme

Based on the framework of so-called "commodity flow method" used in the Annual Estimates, nominal values of domestic household final consumption expenditure and gross fixed capital formation are estimated from multitude of source statistics of both supply side and demand side. However, since the detailed estimation approach used for the Annual Estimates is not technically feasible for compiling QE, somewhat simplified method is employed.

Specifically, the commodity flow method for the Annual Estimates has detailed distribution channel for each category of more than 2,000 commodities (i.e. goods and services), and estimates the amount distributed to each demand component. The supply-side estimation of QE consolidates those more than 2,000 commodities into, in principle, 91 commodities (*) and simplifies their distribution channel. The estimation process can be summarized as follows:

1) Creates the quarterly auxiliary series[1] of shipment (i.e. turnover) for each category of 91-commodity classification using high frequency data (i.e. monthly or quarterly source statistics)
2) Divides the shipment value in the Annual Estimates into quarterly values (i.e. benchmarking), using the quarterly pattern of the auxiliary series
3) Starting from the shipment value in the last quarter (October-December) of the most recent calendar year in the Annual Estimates, preliminary quarterly values are extrapolated using quarter-to-quarter change rate in the auxiliary series. This yields the quarterly shipment values in line with the 91-commodity classification.
4) Domestic total supply is obtained after adjusting for trade and transport margins, import and export, and deducting changes in inventories for materials/supplies and wholesale/retail trade, which are separately estimated.
5) Domestic household final consumption expenditure and gross fixed capital formation are estimated by multiplying the domestic total supply by the distribution ratio from domestic total supply to each demand component, which is obtained from the most recent Annual Estimates.

Domestic household final consumption expenditure and gross fixed capital formation derived from supply-side estimation are integrated with the corresponding figures estimated separately from demand-side estimation as explained in the Chapter II.

> (*) Estimation is made based on more detailed category than 91-commodity classification for some commodities: "27 Petroleum products," "42 Electronic parts and devices," "46 Communications equipment and allied equipment," "47 Electronic computers and attachments," "48 Automobiles," "62 Construction," "76 Information services, video picture, sound information, character information production and distribution," "77 Finance," "78 Insurance," and "84 Other business services"
> Hereafter, the term "91-commodity classification" is used as including these subcategories.

2. Creating Auxiliary Series for Shipment Values

Depending on commodities and source statistics, several different methods for creating

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[1] In this document, "auxiliary series" refers to the series constructed from high frequency source data (e.g. monthly or quarterly) which is deemed to represent the development of the value to be estimated (such as shipment, change in inventories, wage and salaries, etc.) as much as possible.

auxiliary series for quarterly shipment values are employed:

1) Auxiliary series derived entirely from a single series
   If there exists a series that almost completely represent the shipment value of a commodity, then that series is used directly as auxiliary series.

2) Auxiliary series created by aggregating two or more series
   If there exist two or more series that, in total, correspond to the shipment value of a commodity, those series are aggregated to create the auxiliary series.

3) Auxiliary series created by multiplying quantity by price
   In the case that the shipment volume data is only available for a commodity, the auxiliary series is created by multiplying this volume data by price index that corresponds to the definition of the commodity as much as possible. The price index is either directly adopted from price statistics or estimated by CAO.

4) Wholesale and retail trade
   The auxiliary series for the trade margin of wholesale and retail sector is created by multiplying the sales value obtained from *Current Survey of Commerce* (METI) by the margin ratio (i.e. (sales – cost of sales)/sales) obtained from *Financial Statements Statistics of Corporations by Industry* (MOF).

   > Wholesale/retail margin = Margin ratio $\times$ Sales value
   > $\qquad$ ={(Sales – Cost of sales) / Sales} × Sales value

   Since *Financial Statements Statistics of Corporations by Industry* is unavailable at the timing of estimating both the first QE and the second QE, the average margin ratio for the most recent four quarters is used for the extrapolation. Hence, the margin ratio obtained from *Financial Statements Statistics of Corporations by Industry* for the quarter in question is incorporated on occasion of the estimation of the first QE of the following quarter as the source information for its previous quarter.

5) Auxiliary series derived from demand-side estimation
   If an appropriate auxiliary series cannot be obtained from supply-side statistics, the shipment value is approximated by relevant data from demand-side statistics such as "Family Income and Expenditure Survey" (MIC).

6) Others
   Auxiliary series are estimated by a combination of the above methods.

See Annex 3 for more detailed information on the source statistics used to estimate auxiliary series for each of the 91-commodity classification and which of the above method from 1) to 6) is adopted, as well as how to extrapolate the missing values in the case that the source data on one or two months of the quarter in question (e.g. third month) are unavailable due to the timeliness of the source statistics.

3. Quarterly Distribution of Annual Estimates' Shipment Values (Benchmarking)

Two methods are used for the quarterly distribution of the Annual estimates of shipment values, i.e. benchmarking. The first is "pro-rata method," which estimates the quarterly data during a particular calendar year Annual estimates (i.e. benchmark series) according to the quarterly pattern of auxiliary series in the year in question. The second is called "proportional Denton method," which keeps the ratio of the benchmarked series to the auxiliary series (i.e., the quarterly BI ratio) as constant as possible subject to the constraint that the sum of the quarterly

values equals to benchmark calendar year value for each year. That said, the proportional Denton method is applied only on occasion of benchmark year revision, and the pro-rata method is used for benchmarking of the most recent years.

<Pro-rata method>

Auxiliary series for the calendar year y	A_y
Auxiliary series for the quarter i in the calendar year y	a_{4y-4+i} (I = 1, 2, 3, 4)
	$(A_y = a_{4y-3} + a_{4y-2} + a_{4y-1} + a_{4y})$

Calendar year shipment value for Annual Estimates under the 91-commodity classification
$$Q_y$$
Quarterly shipment value for Annual Estimates under the 91-commodity classification
$$q_{4y-4+i} = Q_y \times (a_{4y-4+i} / A_y)$$

<Proportional Denton method>

$$\min \sum_{t=2}^{T} [\frac{q_t}{a_t} - \frac{q_{t-1}}{a_{t-1}}]^2 \quad s.t. \quad \sum_{t=4y-3}^{4y} q_t = Q_y \quad (y = 1.2.\cdots,\beta)$$

- t: Quarter t (4y-3 represents the first quarter of the calendar year y, 4y represents the fourth quarter of the calendar year y)
- q_t: Quarterly value of Annual Estimate that is sought
- a_t: Quarterly value of auxiliary series
- T: Final quarter t to which proportional Denton method is applied
- y: Calendar year y (β is the final year y that serves as the benchmark)
- Q_y: Calendar year value for Annual Estimate of year y that serves as a benchmark

4. Extrapolating Preliminary Shipment Values

Based on the most recent quarter value in the Annual Estimates as created in 3., preliminary shipment data is extrapolated, using quarter-to-quarter change rate of the auxiliary series.

Latest quarterly shipment value in the Annual Estimate for the 91-commodity classification	$q_{4\beta}$
Auxiliary series for the quarter in question	$a_{4\beta}$
Preliminary quarterly shipment value for the 91-commodity classification	$q_{4\beta+1} = q_{4\beta} \times (a_{4\beta+1} / a_{4\beta})$
	$q_{4\beta+2} = q_{4\beta+1} \times (a_{4\beta+2} / a_{4\beta+1})$

$$\cdot$$
$$\cdot$$
$$\cdot$$

5. Estimating Demand Components

1) Adjustment for exports and imports

Domestic supply at producers' price for each 91-commodity classification is estimated by adding the imports to the shipment values and then subtracting exports. The exports and imports are estimated from *Trade Statistics* (MOF) and *Balance of Payments* (MOF and BOJ).

2) Converting to purchasers' price

Trade and transport margins are added to the domestic supply for the following 91-commodity classification in order to convert the value to purchasers' price: commodity #1-57, 76, 90, and 91, In the case of wholesale and retail, cost-type trade margin is excluded (e.g. secondhand goods trading, etc.), and the remaining margins are allocated to each commodity. Likewise, as to transportation, the freights other than cost-type (e.g. transportation activities as part of a production process) and passenger-related transportation activities are allocated to each commodity.

3) Adjusting for the change in inventories

Domestic total supply is finally estimated by subtracting the change in inventories of material s/supplies and wholesale/retail trade. The details of the estimation methods of those change in inventories are shown in II.4.

4) Estimating demand components

The domestic household final consumption expenditure and gross fixed capital formation are estimated by multiplying the domestic total supply by the distribution ratio from domestic total supply to each demand component derived from the latest First Annual Estimates (for more information on the distribution ratio, see Annex 1).

> Domestic household final consumption expenditure
> = Domestic total supply
> × Distribution ratio of domestic household final consumption expenditure
>
> Gross fixed capital formation
> = Domestic total supply × Distribution ratio of gross fixed capital formation

6. Estimating FISIM

FISIM (financial intermediation services indirectly measured) is estimated for both borrower's side (loan) and lender's side (deposit).

> FISIM = Borrowers' FISIM + Lenders' FISIM
> Borrowers' FISIM
> =Total loans outstanding × (Lending interest rate – Reference interest rate)
> Lenders' FISIM
> =Total deposits outstanding × (Reference interest rate – Deposit interest rate)

In the QE estimation, the outstanding and interest rates are extrapolated from the Annual Estimates, respectively for the borrower's side and lender's side

1) Estimating loans/deposits outstanding

Loans outstanding of private financial institutions is extrapolated using a quarter-to-quarter change rate of loans outstanding provided by domestic banks and credit associations based on *Principal Figures of Financial Institutions* (BOJ). Loans outstanding of public financial institutions is extrapolated using preceding three years' average of quarter-to-quarter change rates of the loans outstanding. Likewise, deposits outstanding for both private and public financial institutions is extrapolated using preceding three years' average of quarter-to-quarter change rate of the deposits. The deposits and public financial institutions' loans are replaced by the realized values obtained from *Flow of Funds Accounts* (BOJ) on occasion of estimating following quarter's first QE.

2) Estimating interest rates

Interest rates to estimate FISIM are extrapolated from the auxiliary interest rates used in the First Annual Estimates. Lending rate is extrapolated by average loan rate provided by domestic banks and credit associations, while deposit rate is extrapolated by average deposit rate of floating and fixed deposits to domestic banks and credit associations. Reference rate, calculated as effective interest rate of loans and deposits among financial institutions, is estimated using the relevant outstanding and interest rate extrapolated.

FISIM consumption is derived by adjusting the FISIM output estimated as abovementioned for external transactions. In the Annual Estimates, FISIM consumption by each institutional sector is estimated through distributing total consumption according to composition weights, which are constructed by creating the auxiliary series of each sector's FISIM consumption using loans/deposits outstanding and interest rate differentials (i.e. the difference between reference rate and lending/borrowing rate). In the QE estimation, the composition weight is updated by incorporating the outstanding data of the latest *Flow of Funds Account*s.

Exports and imports of FISIM in the Annual Estimates are compiled based on the international business interest rate of city banks and the interest amount in *Balance of Payments*. In the QE estimation, the latest Annual Estimates' values are used.

II. Estimation of Demand Components in Nominal Term

1. Private Final Consumption Expenditure (Private Consumption)

(1) Final Consumption Expenditure of Households (Consumption of Households)

1) Domestic final consumption expenditure of households

The domestic final consumption expenditure of households is estimated by aggregating the estimates calculated with respect to each item listed in the classification of the goods and services by 88 purposes (88-purpose classification),[2] which consists of the following three.

(a) Parallel estimate items (the share in domestic final consumption expenditure of households is around 50%): obtained as weighted averages of the supply-side and demand-side estimates calculated in parallel, using a fixed weight (integration ratio) and

(b) Common estimate items (the share is around 40%): calculated from various source statistics without distinguishing supply-side or demand-side, and

(c) Sales of goods and services (the share is less than 10%): corresponding to the goods and services produced and sold by the general government and the private non-profit institutions serving households (NPISH), estimated by trends, etc.

(a) Parallel Estimate Items
Demand-side estimates

Preliminary quarterly estimates are calculated by extrapolation from the quarterly series benchmarked to the First Annual Estimates with proportional Denton method using the auxiliary series (i.e., total household consumption by item) derived from *Family Income and Expenditure Survey*, *Survey of Household Economy* (MIC) (*1), the number of households, etc., with respect to each item of the 88-purpose classification (*2). The above extrapolation is based on growth rates of the auxiliary series. "Electricity" and "Water supply" are estimated in this approach only and treated as common estimate items, not parallel.

The auxiliary series are sum of the two series, namely, total household consumption by item for two type of household: (i) two-or-more-person households and (ii) single-person households. The auxiliary series for each type of household are calculated as the product of the consumption expenditure per household (re-classified in line with the 88-purpose classification) (*3) from *Family Income and Expenditure Survey* (two-or-more-person households (nationwide)) and the number of households by type estimated from *Population Census* (MIC), *Population Estimates* (MIC), etc.

As for single-person households, the level of consumption is corrected to the level of the consumption expenditure of single-person household obtained from *National Survey of Family Income and Expenditure* (MIC).

*1: For compiling the demand-side auxiliary series for final consumption expenditure of household, any items which can be calculated from both of *Family Income and*

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[2] After the benchmark year revision of 2011, some of the items in the 88-purpose classification are reclassified to different types for enhancing consistency with UN COICOP. Concretely, (1) "Books" in 9. Entertainment, leisure services and culture is reclassified from Nondurable good to Semi-durable good, (2) "Personal care tools and goods" in 12. Miscellaneous goods and services is reclassified from Semi-durable good to Nondurable good, and (3) maintenance and repair costs for machines and equipment etc. included in 3., 5., 7., 9. are reclassified from Durable good or Semi-durable good (in which corresponding machines and equipment etc. is classified) to Service. In addition, some household consumables included in 5. Furnishing, household equipment and homemaking services are transferred to "Personal care tools and goods" in 12. Miscellaneous goods and services, and (5) school meals included in 10. Education are transferred to "Wining/dining service" in 11. Restaurants and hotels.

Expenditure Survey and *Survey of Household Economy* are calculated from the latter.

*2: To be precise, from 2011, prior to benchmarking the quarterly series to Annual Estimates, the Annual Estimates are transformed into "final consumption expenditure of households" basis by adjusting the direct purchase calculated in 2) (resident households' direct overseas purchase is added, and non-resident households' direct domestic purchase is subtracted), and the extrapolation is conducted from the quarterly series benchmarked to the transformed Annual Estimates. Afterwards, by restoring the direct purchase in the quarter, demand-side estimates are transformed into "domestic final consumption expenditure of household" basis. The nominal series of direct purchase with respect to each item in the 88-purpose classification is estimated by using *Consumption Trend Survey for Foreigners Visiting Japan* (MLIT) and *Input-Output Table* (MIC) (annual estimates of *Consumption Trend Survey for Foreigners Visiting Japan* became available since 2011).

*3: For each item from *Family Income and Expenditure Survey* used in the demand-side auxiliary series for final consumption expenditure of households, the level of the series is corrected to the level of consumption expenditure after adjusting the distribution by age group of the head of household (by 10 major categories; two-or-more-person households; preliminary estimates as addenda) in *Family Income and Expenditure Survey*, when available (since 2013).

Supply-side estimates

The estimates of domestic final consumption expenditure of households obtained from supply-side are transformed from 91-commodity classification basis to the 88-purpose classification, using the weight of further detailed commodity classifications obtained in the process compiling the Annual Estimates.

Method of integration

The following formula integrates the demand-side and the supply side. Integration is performed with respect to each parallel estimate item of the 88-purpose classification of domestic final consumption expenditure of households.

Integrated value of domestic final consumption expenditure of households (by parallel estimate item) = $kC_d + (1 - k)C_s$

C_d: demand-side estimates
C_s: supply-side estimates
Weight $k = 0.3139$

The above weight was obtained as below.

$$k = \arg\min_{\tilde{k}} \sum_t [Y_t - \{\tilde{k}D_t + (1 - \tilde{k})S_t\}]^2$$

Y_t: growth rate of the annual estimates (benchmark year: 2011)

D_t: growth rate of the demand-side estimates calculated similarly to QE with benchmark year 2011

S_t: growth rate of the supply-side estimates calculated similarly to QE with benchmark year 2011

t: from 1995 to 2014 (excluding 2000 where the supply-side estimates are disconnected)

Each of the above growth rate is the ratio of an estimate for a calendar year to the annual estimate for its previous calendar year

Table 1: 88-Purpose Classification of Domestic Final Consumption Expenditure of Households

	1.Durable goods	2.Semi-durable goods	3.Non-durable goods	4.Services
1. Food and non-alcoholic beverages				
1101 Bread and cereals			O	
1102 Meat and meat substitute products			O	
1103 Fish and marine products			O	
1104 Milk, cheese and eggs			O	
1105 Oil and fats			O	
1106 Fruit			O	
1107 Vegetables			O	
1108 Sugar, chocolate and confectionery			O	
1109 Other foodstuff			O	
1201 Coffee, tea and cocoa			O	
1202 Other non-alcoholic beverages			O	
2.Alcoholic beverages and tobacco				
2100 Alcoholic beverages			O	
2200 Tobacco			O	
3.Clothing and footwear				
3101 Clothing materials		O		
3102 Garments		O		
3103 Other clothes and clothing accessories		O		
3104 Cleaning and clothing repair costs				O
3201 Shoes and other footwear		O		
3202 Footwear repair cost				O
4.Gross rent, water, electricity, gas and other fuels				
4100 Gross rent				O
4201 Water supply			O	
4202 Waste disposal				O
4301 Electricity			O	
4302 Gas			O	
4303 Liquid fuels			O	
4304 Solid fuels			O	
4305 Heat energy			O	
5.Furnishing, household equipment and homemaking service				
5101 Furniture and furnishings	O			
5102 Carpets and other floor coverings	O			
5103 Repair of furniture, furnishings and floor coverings				O
5200 Household textiles		O		
5301 Household appliances	O			
5302 Repair of household appliances				O
5400 Glassware, tableware and household utensils		O		
5500 Tools and equipment for house and garden		O		
5601 Non-durable household goods			O	
5602 Home services and homemaking services				O
6.Health and medical care				
6101 Medicines and other medical goods			O	
6102 Therapeutic equipment	O			
6200 Outpatient services				O
6300 Hospital stay services				O
6400 Nursing care services				O
7.Transport				
7101 Automobiles	O			
7102 Motorcycles	O			
7103 Bicycles and other vehicles	O			
7201 Spare parts and accessories		O		
7202 Fuels and lubricants			O	
7203 Maintenance and repair of personal transport equipment				O
7204 Other services（Transport）				O
7301 Passenger transport by railway				O
7302 Passenger transport by road				O
7303 Passenger transport by air				O
7304 Passenger transport by sea and inland waterway				O
7305 Other transportation services				O
8.Communications				
8100 Postal service				O
8201 Telephone and telegraph services				O
8202 Other communication services				O
9.Entertainment, leisure services and culture				
9101 Radio, TV and video equipment	O			
9102 Photographic/cinematographic equipment and optical instruments	O			
9103 Information processing equipment	O			
9104 Recording media		O		
9105 Personal computers	O			
9106 Repair of audio-visual, photographic and information processing equipment				O
9201 Musical instruments	O			
9202 Repair of musical instruments				O
9301 Games, toys, etc.		O		
9302 Sporting goods		O		
9303 Garden-, plant- and pets-related goods/services			O	
9401 Recreational and sports services				O
9402 Cultural services				O
9403 Gambling				O
9501 Books		O		
9502 Newspapers and periodicals			O	
9503 Other printed matter			O	
9504 Stationeries and painting goods			O	
9600 Package tour				O
10.Education				
10100 Education				O
11.Restaurant and hotels				
11100 Wining/dining service				O
11200 Accommodation service				O
12.Miscellaneous goods and services				
12101 Hair salon and beauty salon services				O
12102 Personal care tools and goods			O	
12201 Jewelry, clocks and watches	O			
12202 Other personal effects		O		
12301 Life insurance				O
12302 Non-life insurance				O
12400 Financial services				O
12500 Other services				O
12600 FISIM ; Financial Intermediation Services Indirectly Measured				O

<Supplementary information> Detailed explanation on estimation method for demand-side auxiliary series

The consumption expenditure for each parallel estimate item of the 88-purpose classification is estimated as a sum of the formula below for two type of household, namely, two-or-more-person households and single-person households.

The following items in *Family Income and Expenditure Survey* are not used for demand-side auxiliary series, as they are not included in parallel estimate items.

> "'Soba' & 'Udon', Japanese noodles," "Chinese noodles," "Other noodles," ""Sushi", eating out," "Japanese meals," "Chinese meals," "Western meals," "Hamburgers," "Other meals," "Other refreshments" and "Drinking," in "Eating out," "Accommodation services," "School lunch," "Rents for dwelling & land," "Repairs & maintenance" excluding "Tools for repairs & maintenance" and "Gardening," "Medical services," "Purchase of vehicles," "Automotive insurance premium," "Vehicular insurance premium (except cars)," "School fees," "Religious contribution," "Other non-savings type insurance premium," "Nursing care services" and "Obligation fees related to dwelling"

The following items, which are expenditures for transfer, are not used for demand-side either since they are not recognized as consumption expenditure in the System of National Accounts (hereinafter "SNA").

> "Membership dues," "Donation," "Money gifts," "Other obligation fees" and "Remittance"

Consumption expenditure of two-or-more-person households by item
= Consumption expenditure per household (two-or-more-person households (nationwide)) by item in *Family Income and Expenditure Survey* or *Survey of Household Economy*
× Correction factor of *National Survey of Family Income and Expenditure* (two-or-more-person households)
× Adjustment factor for number of members per household
× Number of two-or-more-person households

Consumption expenditure of single-person households by item
= Consumption expenditure per household (single-person households (nationwide)) by item in *Family Income and Expenditure Survey* or *Survey of Household Economy*
× Correction factor of *National Survey of Family Income and Expenditure* (single-person households)
× Adjustment factor for number of members per household
× Number of single-person households

(i) Two-or-more-person households
● consumption expenditure per household by item:
> This component is based on the consumption expenditure per household (two-or-more-person households (nationwide)) in *Family Income and Expenditure Survey* or *Survey of Household Economy*." "Pocket money" and "Social expenses" are allocated to corresponding categories based on their weights based on "Personal Income and Expenditure Table" in *National Survey of Family Income and Expenditure*. For each item in *Family Income and Expenditure Survey* used in the demand-side auxiliary series, the level of the series is adjusted to the level of consumption expenditure after adjusting the distribution by age group of the head of household (by 10 major categories; two-or-more-person households; preliminary estimates as addenda)in *Family Income and Expenditure Survey*, when available (since 2013).

● Correction factor of *National Survey of Family Income and Expenditure* (two-or-more-person households):

In order to correct sampling errors in *Family Income and Expenditure Survey* (about 9,000 households surveyed) or *Survey of Household Economy* (about 30,000 households surveyed), the level of the consumption expenditure per household by item is corrected to the level of the consumption expenditure in *National Survey of Family Income and Expenditure*, which is surveyed once every five years (about 57,000 households surveyed). Each item is corrected by multiplying the ratio of consumption expenditure per household by item for two-or-more-person households in *National Survey of Family Income and Expenditure* to consumption expenditure per household by item (two-or-more-person households (nationwide)) in *Family Income and Expenditure Survey* or *Survey of Household Economy* as of the time when National Survey of Family Income and Expenditure is surveyed

● Adjustment factor for number of members per household:

There is a gap between the number of members per household in *Family Income and Expenditure Survey* or *Survey of Household Economy* and the number of members per household estimated as below. For adjusting the number of members per household to the latter, the consumption expenditure per household by item is multiplied by the adjustment factor for number of members per household. The adjustment factor is calculated as follows.

$$P = \frac{C_K}{C_H} = \frac{(4 - X_K)C_3 + (X_K - 3)C_4}{(4 - X_H)C_3 + (X_H - 3)C_4}$$

(if the average number of members per household is between 3 and 4)

P: Adjustment factor for number of members per household

C_H: Consumption expenditure if X_H persons belong to a household

C_K: Consumption expenditure if X_K persons belong to a household

X_H: Per-household members of *Family Income and Expenditure Survey* or *Survey of Household Economy*

X_K: The number of members per household estimated from *Population Census*, etc.

C_3: Consumption expenditure of three-member households in *Family Income and Expenditure Survey* or *Survey of Household Economy*

C_4: Consumption expenditure of four-member households in *Family Income and Expenditure Survey* or *Survey of Household Economy*

● Number of households:

The number of households is estimated by dividing the population belonging to two-or-more-person households by the number of members per household. The population is calculated as the total population in *Population Estimates* less the number of single-person households. The number of members per household is benchmarked to *Population Census* for the census year and linearly interpolated or extrapolated for intermediate years.

(ii) Single-person households

● Consumption expenditure per household by item

This component is based on the consumption expenditure per household (two-or-more-person households (nationwide)) in *Family Income and Expenditure Survey* or *Survey of Household Economy*. ("Pocket money" and "Social expenses" are allocated and the items in *Family Income and Expenditure Survey* used in demand-side auxiliary series are adjusted, in the same manner as for two-or-more-person households.)

● Correction factor of *National Survey of Family Income and Expenditure* (single-person households):

Each item is corrected by multiplying by the ratio of consumption expenditure per household by item for single-persons household in *National Survey of Family Income and Expenditure* to consumption expenditure per household by item (two-or-more-person households (nationwide)) in *Family Income and Expenditure Survey* or *Survey of Household Economy* as of the time when *National Survey of Family Income and Expenditure* is surveyed.

● Adjustment factor for number of members per household

For adjusting the number of members per household in *Family Income and Expenditure Survey* or *Survey of Household Economy* to the number of members per household as of the time when *National Survey of Family Income and Expenditure* used for the correction above is surveyed, in the same manner as for two-or-more-person households.

● Number of households:

"Single-person general households" and "institutional household members" in *Population Census* are regarded as single-person households and the number of household is estimated by multiplying the share of single-person household for each age group (linearly interpolated or extrapolated for intermediate years) by the population by age group in *Population Estimates*.

(b) Common Estimate Items

Rent

Rent (excluding imputed rent for owner-occupied dwellings) is estimated from number of housing, floor area, and unit house rent by structure (wooden / non-wooden) based on the *Housing and Land Survey* (MIC) for the target years of the Survey. For all other years, estimations are made from increases and decreases in floor area derived from *Building Starts Statistics* and *Building Disposal Statistics* (MLIT), etc., and from unit house   rent derived from *Consumer Price Index* (MIC).

Rent (imputed rent for owner-occupied dwellings) is estimated from the floor area that takes into consideration attributes such as the prefecture, structure, construction period, etc., the home ownership rate derived from *Housing Starts Statistics* and the unit house rent for rented dwellings from private owners.

Medical and nursing care services

As components for domestic final consumption expenditure of households, the medical care services (outpatient services, hospital stay services) and nursing care services are calculated by estimating the total expenditure for each service and deducting the portion of expenditure paid by public insurance, which is allocated to government final consumption expenditure.

For the Annual Estimates, the total expenditure for medical care service is extrapolated based on the rate of change in national medical expenses etc., using the *Input-Output Table* (MIC) as the benchmark, and the resultant values are basically divided into quarterly series in the same manner as the portion recorded as government final consumption expenditure. For preliminary estimates, if there is no institutional change, the total expenditure is assumed to grow at the same rate as insurance payments, and extrapolations are based on a quarter-to-quarter rate of change in insurance payments recorded as government final consumption expenditure. (See "5. Government Final Consumption Expenditure.") If there was an institutional change, estimations additionally take into consideration the changes in insurance payments caused by changes in the portion paid by patients.

The total expenditure for nursing care services is calculated by extrapolating Annual Estimates using *Current State of Long-Term Care Benefits* (All-Japan Federation of National Health Insurance Organizations).

Water supply and electricity
The estimation method is as described in Demand-side estimates in (a).

Automobile, wining/dining services, accommodation services, insurance (life insurance, non-life insurance), financial services (including FISIM), real estate commission on transaction and rent (part of other services)
The estimates by commodity are derived by the method described in "I. Method for supply-side estimations."

(c) Sales of goods and services
Sales of goods and services refer to goods and services that households purchase from the general government or private non-profit institutions serving households such as tuition or admission fee for a public facility ,which are recorded as the domestic final consumption expenditure of households in the SNA.

Quarterly estimate for each item is calculated by extrapolating the Annual Estimates based on the trend or growth in budget, and then dividing it according to the quarterly allocation pattern of the preceding year.

2) Direct purchases abroad by resident households and direct purchases in the domestic market by non-resident households
Final consumption expenditure of households is calculated by adding direct purchases abroad by resident households to domestic final consumption expenditure of households estimated as in 1), and then subtracting direct purchases in the domestic market by non-resident households.
  This component is estimated by transforming the *Balance of Payments*.

(2) Final Consumption Expenditure of NPISH

When compiling Annual Estimates, the output (i.e., sum of cost such as employees' compensation and intermediate input), sales of goods and services (goods and services provided by NPISH and purchased by households, etc.) and own-account gross fixed capital formation related to research and development are estimated according to the two activity purposes of "education" and "others," using the *Survey on Private Non-Profit Institutions* (CAO) and *Survey of Research and Development* (MIC), etc. The final consumption expenditure of NPISH equals to their output level less their sales of goods and services and own-account gross fixed capital formation related to research and development. When allocating Annual Estimates into quarterly series, if an estimated component (e.g., employees' compensation in the "education" category) has closely related quarterly source statistics, their seasonal patterns are taken into account (e.g., the wage indices for education, social insurance and social welfare, academic research, etc. for businesses with five or more employees in *Monthly Labour Survey* (M HLW)). In other cases, the Annual Estimates are simply divided by four.

In preliminary estimations, estimates for the current fiscal year are estimated by extrapolating the Annual Estimates of the previous fiscal year by activity purpose, then dividing this estimates according to the quarterly allocation pattern of the preceding fiscal year. Extrapolation of output is based on trends. Estimation for "education" is based on trend using the number of staff at private schools in *School Basic Survey* (MEXT). Sales of goods and services are estimated by extrapolating the ratio to output by trend and multiplying the ratio by the output. As for own-account gross fixed capital formation related to research and development, see "3. (2) (c) Non-residential investment of NPISH (excluding software)."

2. Private Residential Investment

Private residential investment is calculated by deducting public residential investment from total residential investment, which is estimated from estimated construction costs, and adding the gross fixed capital formation regarding real estate commission on transaction obtained from supply-side estimates.

Total residential investment is calculated by converting the estimated construction costs by type of structure for residential buildings (single purpose) and for residential-commercial dual-purpose buildings (of which 70% is assumed to be residential purpose) in *Building Starts Statistics* into accrual basis based on the average construction period (*) by type of structure and purpose (residential, residential-commercial dual-purpose), and then multiplying it with the applicable correction factor in order to correct possible errors on construction work unit price or housing starts. The types of structure are the following: Wooden, steel-framed reinforced concrete, reinforced concrete, steel-framed, concrete block, and others.

The average construction period by type of structure and purpose is basically re-estimated every five years (interpolated for intermediate years), using construction period etc. in *Annual Report on Construction Statistics* (MLIT).

(*)   The average construction period is estimated from the distribution of construction periods by structure and floor area for all buildings in *Annual Report on Construction Statistics*. Since the population of the statistics is not limited to residential buildings, the average construction period for the residential building is derived as an approximate from the average over the buildings with floor area corresponding to the size of residential buildings.

3. Private Non-Residential Investment

Private non-residential investment is estimated as a sum the following two.

(1)   Parallel estimate items (the share in private non-residential investment is around 70%): obtained as weighted averages of the supply-side and demand-side estimates calculated in parallel, using a fixed weight (integration ratio). The supply-side estimates are computed by subtracting components such as public fixed capital formation and private residential investment from the total of gross fixed capital formation estimated by supply-side, while the demand-side estimates are the sum of non-residential investment of private non-financial corporations, non-residential investment by financial institutions, and non-residential investment by households (unincorporated enterprises).

(2)   Common estimate items (the share is around 30%): which consist of the private sector's portion of the total of R&D and software calculated from various source statistics, and the non-residential investment of NPISH estimated by trends.

(1) Parallel Estimate Items
1) Demand-side estimates
Demand-side estimates are available from the second QE. Preliminary quarterly estimates are calculated by extrapolation from the quarterly series benchmarked to the First Annual Estimates with proportional Denton method using the auxiliary series of non-residential investments derived from *Financial Statements Statistics of Corporations by Industry* for non-financial corporations and financial corporations, and from *Unincorporated Enterprise Survey* (MIC) for unincorporated enterprises. The above extrapolation is based on quarter-to-quarter growth rates.

The auxiliary series are calculated as follows.

 (a) Non-residential investment of private non-financial corporations

This series is estimated from investment (investment in tangible fixed assets) in *Financial Statements Statistics of Corporations by Industry*. In this process, to mitigate the gap due to the annual resampling and the influence of the difference in the sample between quarters in the source statistics, adjustment factors are multiplied as follows.

The tangible fixed assets in *Financial Statements Statistics of Corporations by Industry* is not coherent as a time series since the value at the end of the current period differs from the value at the beginning of the next period. Therefore, a connected time series of stock is calculated by setting April-June 1994 as the tentative benchmark quarter and cumulatively multiplying the ratio of the value at the end to the value at the beginning for each period. The level of the series depends on the choice of the tentative benchmark quarter, while an appropriately benchmarked series should have roughly same number of the periods in which the benchmarked series is above the observed value and the periods in which the series is below the observed. In addition, since *Financial Statements Statistics of Corporations by Industry* has a different sampling rate for each capital size bracket and the size of the gap may vary with the sampling rate, it is desirable to derive the adjustment factor for each bracket. Thus, the capital size brackets are divided into four brackets: 10 million yen to 50 million yen, 50 million yen to 100 million yen, 100 million yen to 1 billion yen, and 1 billion yen or more. For the first three categories, the observed value at the end of period is regressed on the above connected time series (log-linear least squares) and the benchmarked series of stock is calculated by multiplying the connected series by the regression coefficient. Then, assuming that the flow series is proportional to the stock, a coherent time series of investment can be calculated by multiplying the observed value of investment by an adjustment factor, that is, the ratio of the benchmarked series of stock to the observed value of stock. In contrast, for the capital size bracket of 1 billion yen or more, utilizing the advantage of the survey as a census for this bracket and considering the possibility of transition between the brackets, the adjusted series is calculated as an average of the observed value of investment in *Financial Statements Statistics of Corporations by Industry* and the coherent series derived similarly to the above three brackets.

As for the corporations with capital less than 10 million yen which are not covered by the quarterly report of *Financial Statements Statistics of Corporations by Industry*, their investment is calculated by multiplying the sum of the above four adjusted series by the ratio of the investment of the corporations with capital less than 10 million yen to the investment of the corporations with capital more than 10 million derived by the annual report of the statistics. It should be noted that the ratio is converted from the annual frequency to quarterly by the Lisman-Sandee method (the current year's quarterly estimates are estimated from the value of the preceding, current and next fiscal years.) while the latest actual ratio is used for the periods the actual ratio is not available yet..

(b) Non-residential investment by private financial institutions
This series is estimated from investment of financial and insurance industries in *Financial Statements Statistics of Corporations by Industry*.

(c) Non-residential investment by households (unincorporated enterprises)
(Agriculture)

The investment by households belonging to this industry is calculated by multiplying investment per agricultural household by the number of agricultural households. The investment per agricultural household is calculated by benchmarking to the fiscal year amount of the capital investment portion of the fixed asset purchase per agricultural household in *Statistical Survey on Farm Management and Economy* (MAFF) and extrapolating based on a series converted into accrual basis from the estimated construction costs for unincorporated business in agricultural and fishery sector in

Building Starts Statistics. The number of agricultural households is calculated by extrapolating *Census of Agriculture and Forestry* and *Survey on Movement of Agricultural Structure* (both MAFF).

(Manufacturing industry and wholesale and retail industries)
To estimate investment for machinery, equipment and others except buildings, the amount of purchasing machinery and equipment per enterprise in *Unincorporated Enterprise Survey* is multiplied by the number of unincorporated enterprises. Up to 2006, the year *Establishment and Enterprises Census* is available, the number of enterprises is calculated by interpolating the number of unincorporated enterprises in *Establishment and Enterprises Census* using a quarter-on-quarter growth rate of the number of self-employees in *Labor Force Survey*. After 2006, the number of enterprises is extrapolated by quarter-on-quarter growth rate of the number of self-employees in *Labor Force Survey*. As for buildings, the investment is derived by converting into accrual basis from the estimated construction cost paid by individual belonging to corresponding industries in the table by type of investor and use in *Building Starts Statistics*

(Service industry)
Basically, the investment is estimated in the same manner as the manufacturing industry and wholesale and retail industries. However, as for the per-enterprise investment for machinery, equipment and others except buildings, the investment is benchmarked to the investment per unincorporated enterprises in *Economic Census* and extrapolated by using the quarter-on-quarter growth rate of the amount of purchasing machinery and equipment per enterprise.

(Other industries)
The investment is derived by converting into accrual basis from the estimated construction cost paid by individual belonging to the corresponding industries in *Building Starts Statistics.*

(Assumption in the first QE)
Since the source statistics for private non-residential investment differs between the first QE and second QE, the seasonal patterns of the original series of them could also differ. As a result, at the time of the first QE, if seasonal adjustment is applied to a series simply connecting the new estimate and the estimates in the second QE released in the previous quarter, the difference in the seasonal patterns may distort the seasonally adjusted series.

Therefore, while demand-side estimate for the latest quarter cannot be estimated by source statistics for the first QE, seasonally adjusted series of tentative demand-side estimates is calculated by assuming the seasonally adjusted quarter-on-quarter growth rate $(T \times C \times I)$ of the demand-side estimates equals to the growth rate of trend cycle component $(T \times C)$ of supply-side estimates, and corresponding tentative original series of demand-side estimates (I_p) is recovered by dividing the above tentative estimate by the predicted seasonal factor of the demand estimates. Then, the tentative demand-side estimates and supply-side estimates are integrated in the same manner as the second QE.

2) Supply-side estimate
The gross fixed capital formation calculated in "I. Method for supply-side estimations" is used.

3) Method of integration
The private non-residential investment level is integrated by the following formula.
Integrated value of Private Non-Residential Investment $= kI_p + (1-k)(I_t - I_g)$

I_p: Estimated value for private non-residential investment based on demand-side statistics

I_t: Gross fixed capital formation from supply-side estimates (excluding private residential investment, non-residential investment of NPISH, R&D and software)

I_g: Public fixed capital formation estimated using *Integrated Statistics on Construction Works* (M LI T)

Weight $k = 0.4908$

The above weight was obtained by a similar method for domestic final consumption expenditure of households.

(2) Common Estimate Items

(a) Software

Since software a portion of "Information services, video picture, sound information, character information production and distribution (commodity classification 76)," in supply-side estimates, the portion is separately estimated and treated as common estimate items. To be more specific, software shipment value in Annual Estimates is divided into make-to-order software, packaged software and self-developed software. For make-to-order software and packaged software, sales for "orders for software" and "software products" from *Survey of Selected Service Industries* (METI) are used as the auxiliary series in benchmarking and extrapolation. With regard to self-developed software, since there are not enough source statistics available, the Lisman-Sandee method is used for benchmarking and extrapolating in the Annual Estimates. Then, the amount allocated to gross fixed capital formation is calculated by multiplying the above shipment value by the corresponding allocation ratio under the commodity flow method in the Annual Estimates. The portion of private non-residential investment is derived based on the share of private industry in software industry calculated from the fixed capital matrix of *Input-Output Table*, in the same manner as Annual Estimates.

(b) Research and development (other than by NPISH)

The portion of research and development by the private companies is calculated by multiplying the value of shipment from market producers ("Research and development services" (commodity classification 81)) of supply-side estimates by the share of private companies in the previous fiscal year. The fiscal year value of shipment from market producers is extrapolated[3] based on the year-on-year growth rate of planned research and development expenditure in various corporate surveys, while setting the latest first Annual Estimates the benchmark. Then, a quarterly series is derived by benchmarking to the fiscal year value obtained above using past seasonal patterns of selling, general and administrative expenses of corporations with capital 1 billion yen or more of all industries (excluding the finance and insurance industry) in *Financial Statements Statistics of Corporations by Industry* The portion recorded in private non-residential investment is calculated by proportionally dividing the value of shipment from market producer based on the share of private companies among market producers in the previous fiscal year. Private non-residential gross fixed capital formation is calculated by adding net imports to shipment values. Net imports are obtained as payment less receipt of research and development services in *Balance of Payments.*

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[3]Concretely, using the year-on-year growth rate of planned research and development costs in *Survey on Planned Capital Spending* (Large Corporations) (DBJ) as the basis, changes in the rate of return on fixed capital (estimated from the ratio of operating profit to net sales of all industries (excluding finance and insurance industry) for corporations with capital 1 billion yen or more in *Financial Statements Statistics of Corporations by Industry*) are taken into consideration. To use the year-on-year growth rate of planned research and development expenditures in source statistics in estimations, the deviation of the planned spending from the actual in past (year-on-year growth rate) is taken into account. In addition, with regard to the rate of return on fixed capital, while the Annual Estimates are based on the backward three-year moving average of the ratio of operating profit to net sales in *Financial Statements Statistics of Corporations by Industry,* the ratio of operating profit to net sales is set to the ratio in the previous fiscal year for deriving the rate of return on fixed capital for the preliminary estimates.

(c) Non-residential investment of NPISH (excluding software)

While the Annual Estimates are calculated from *Survey on the Private Non-Profit Institutions* etc., the quarterly preliminary estimates are calculated by extrapolating the fiscal year value of the Annual Estimates with trend and dividing by four. For research and development, the Annual Estimates are derived from *Survey of Research and Development* and the quarterly preliminary estimates are computed by extrapolating the fiscal year value of the Annual Estimates with trend and allocating to quarters using the pattern from the previous fiscal year.

4. Change in Private Inventories

Change in private inventories is estimated for each of the four inventory components: materials and supplies, work-in-progress, finished goods, and wholesale and retail trade.

For periods in which Annual Estimates exist, the quarterly data is estimated in the following process:
  a) Estimating quarterly values of inventory changes from source statistics
  b) Calculating a difference between the sum of the above four quarters in a particular calendar year and the corresponding calendar year value in the Annual Estimates (estimated through the commodity flow method)
  c) Adding ¼ of the difference of b) to a).

During preliminary estimation periods in which Annual Estimates do not exist, quarterly data is estimated by adding the difference b) in the latest year in the Annual Estimates to the change in inventories estimated from the source statistics. In the case that the change in public inventories is included, it is separately estimated and deducted from the estimates (see 7.).

Periods in which Annual Estimates exist:

Change in inventories in calendar year t, as estimated from source statistics	B_t
Change in inventories in quarter i, calendar year t, as estimated from source statistics	$b_{t,i}$ $(i = 1,2,3,4)$
	$(B_t = b_{t,1} + b_{t,2} + b_{t,3} + b_{t,4})$
Change in inventories in calendar year t in the Annual Estimates	Q_t
Change in inventories in quarter i, calendar year t for the Annual Estimates	$q_{t,i} = b_{t,i} + \dfrac{(Q_t - B_t)}{4}$

QE periods:

Change in inventories in calendar year t, as estimated from source statistics	B_t
Change in inventories in quarter i, calendar year t, as estimated from source statistics	$b_{t,i}$ $(i = 1,2,3,4)$
	$(B_t = b_{t,1} + b_{t,2} + b_{t,3} + b_{t,4})$
Change in inventories in calendar year t - n from the latest Annual Estimates	Q_{t-n} $(n = 1,2)$
Quarterly value for the change in inventories in quarter i, calendar year t - n in the latest Annual Estimates	$q_{t-n,i} = b_{t-n,i} + \dfrac{(Q_{t-n} - B_{t-n})}{4}$
Change in inventories in QE period in quarter i, calendar year t	$q_{t,i} = b_{t,i} + \dfrac{(Q_{t-n} - B_{t-n})}{4}$

(1) Basic Idea of Estimating Change in Inventories

In the national accounts, the principle of accrual basis is adopted where change in inventories is evaluated at market price prevailing at the time of increase/decrease of inventories. Available data on inventories, however, are based on business accounting standard in which the balance of inventories is evaluated by various methods including the periodic average method and FIFO (first-in, first-out method), etc. Consequently, the increase/decrease calculated as the difference between closing balance and opening balance of inventories contains the change attributable to the evaluation price difference during the period in question.

For this reason, an adjustment the difference in evaluation between national accounting and business accounting is necessary when estimating change in inventories from the information obtained from business accounting. This is called inventory valuation adjustment.

Inventory valuation adjustment is carried out as follows:

1. Derive nominal balance of inventories by each commodity from source statistics based on business accounting.
2. Estimate the deflator for inventory balance, considering inventory valuation approaches and inventory turnover rates of corporations
3. Calculate the real opening and closing inventory balance by dividing the nominal inventory balance by the commodity-specific inventory balance deflators, and then derive the real change in inventories from the difference between the closing and opening real balances
4. Obtain the period average inventory deflators, and multiply the real change in inventories by this inventory deflator to calculate the nominal change in inventories after inventory valuation adjustment.

(2) Materials and Supplies

The major source information is the inventory balances of materials and supplies by industry (excluding real estate) in *Financial Statements Statistics of Corporations by Industry*. The inventory balances by industry are converted to the inventory balances by commodity (i.e. 91-commodity classification) using the U matrix (i.e. matrix on input of good and services classified by economic activities) in the latest Annual Estimates. The change in inventories is derived by conducting inventory valuation adjustment.

Quarterly Financial Statements Statistics of Corporations by Industry excludes the corporations of capital less than 10 million yen, the inventory balance at the end of each quarter is derived by extrapolating the inventory balance of *Annual Financial Statements Statistics by industry* that cover all sizes of corporations by the change rate from opening balance to closing balance estimated from the *Quarterly Survey*. This change rate is calculated as the predicted value derived from the regression analysis of the inventory balance change rates of corporations of all sizes on that of corporations with capital more than 1 billion yen, in order to avoid the influence by sampling errors inherent in the *Survey* (see Annex 2 for the regression formula).

The change in inventory for "Crude petroleum and natural gas (commodity classification #10)" is later replaced by the alternatively estimated value: the increase in crude oil inventory other than government-stockpiled oil derived from *Oil Statistics* (Agency for Natural Resources and Energy) multiplied by the crude oil unit price (see "(5) Wholesale and retail trade").

Since *Quarterly Financial Statements Statistics of Corporations by Industry* is not available for the estimation of the first QE, the original series (i.e. seasonal unadjusted series) is estimated as the predicted value derived from the ARIMA model which is used for seasonal adjustment for this component. Also, it should be noted that while the change in inventory in the second QE is estimated as aforementioned using *Quarterly Financial Statements Statistics of Corporations by Industry*, the estimation of domestic total supply to derive domestic household

final consumption and gross fixed capital formation cannot reflect this change in inventories of material and supplies due to time constraints. Those information is incorporated in the estimation of domestic total supply of the subsequent first QE as the previous quarter's value.

(3) Works-In-Progress

The major source information is the inventory balances of work-in-progress by industry (excluding construction, real estate, and services) in *Financial Statements Statistics of Corporations by Industry*. The inventory balances by industry are converted to the inventory balances by commodity (i.e. 91-commodity classification) using the V matrix (i.e. matrix on output of goods and services classified by economic activities) in the latest Annual Estimates. The change in inventories is derived by conducting inventory valuation adjustment.

As *Quarterly Financial Statements Statistics of Corporations by Industry* excludes the corporations of capital less than 10 million yen, the inventory balance at the end of each quarter is derived by extrapolating the inventory balance of *Annual Financial Statements Statistics of Corporations by industry* that cover all sizes of corporations by the change rate from opening balance to closing balance estimated from the *Quarterly Survey*. This change rate is calculated as the predicted value derived from the regression analysis of the inventory balance change rates of corporations of all sizes on that of corporations with capital more than 1 billion yen, in order to avoid the influence by sampling errors inherent in the Survey (see Annex 2 for the regression formula).

As for the natural growth of cultivated biological resources including livestock farming (commodity #3), forestry (commodity #5) and fisheries (commodity #6), 1/4 of the change in inventories derived from the latest first Annual Estimates is used due to the data constraint.

Since *Quarterly Financial Statements Statistics by Industry* is not available for the estimation of the first QE, the original series (i.e. seasonal unadjusted series) is estimated as the forecast value based on the ARIMA model which is used for seasonal adjustment for this component.

(4) Finished Goods
The change in inventories for each finished good (other than Rice and wheat (commodity #1) and Livestock farming (commodity #3)) is estimated in the following manner.
1. The inventory balance for each 91-commodity derived from *Census of Manufactures (Report by Commodity)* or *Economic Census for Business Activity* is extrapolated by the auxiliary series constructed as Inventory index (derived mainly from *Indices of Industrial Production* (METI) multiplied by price index (estimated by CAO), in order to estimate the quarter-end series of nominal inventory balance for each 91-commodity.
2. Divide the nominal inventory balance by corresponding inventory balance deflator to obtain real inventory balance for each quarter-end.
3. The shipment value for each 91-commoodity derived from *Census of Manufactures (Report by Commodity)* or *Economic Census for Business Activity* is extrapolated by the auxiliary series constructed as shipment index (derived mainly from *Indices of Industrial Production* multiplied by price index (estimated by CAO), in order to obtain the quarterly series of the shipment value.
4. Calculate the ratio of change in inventories(i.e., ratio of change in inventories to shipment value) using the following formula:
   Ratio of change in inventories
   = ((Real inventory balance at the end of the current quarter – that at the end of the preceding quarter)
     × Quarter average deflator)) / Shipment value
5. The change in inventories for finished goods = Shipment values derived from supply-side estimation × Inventory change rate calculated in 4. above

As the third month value of inventory balance of *Indices of Industrial Production* is not available at the timing of the first QE, the missing value is estimated by multiplying the second month value by the change rate from the previous year's second month to third month value.

As for the change in inventories for finished goods of agriculture, forestry and fisheries industries, (i) Rice and wheat (commodity #1) is estimated by multiplying the increase in brown rice inventory by the corresponding price index (derived from *Agricultural Price Index (MAFF)*), and (ii) Livestock farming (commodity #3), 1/4 of the change in inventories in the First Annual Estimates for the latest year is applied due to the data constraint.

(5) Wholesale and Retail Trade

The inventory balance for each commodity (other than Rice and wheat (commodity #1), Crude petroleum and natural gas (commodity #10), and a part of Petroleum products (commodity #27)) derived from the data on the commodity stock by industry in *Economic Census for Business Activity*, assuming industry is equivalent to commodity, is extrapolated by the change rate of commodity stock of *Current Survey of Commerce* to obtain the inventory balance at each quarter-end. When using *Current Survey of Commerce*, the data on 18 commodities for wholesale and 9 commodities for retail are made correspondent to similar commodities in the 91-commodity classification.

That said, the commodity stock in *Current Survey of Commerce* covers only the large-scale stores. On the other hand, the data on finished goods inventory of Wholesale and Retail industry in *Quarterly Financial Statements Statistics of Corporations by Industry* cover smaller scale stores, although it is not available for the estimation of the first QE and its quarterly fluctuations suffer from the influence of sampling errors. Thus, the predicted value obtained from the regression analysis of the change rates in inventory balance for both wholesale and retail of *Quarterly Financial Statements Statistics by Industry* on those of *Current Survey of Commerce* are used in the QE estimation (see Annex 2 for the regression equations for both wholesale and retail). As the data of *Current Survey of Commerce* does not cover the government-stockpiled liquefied petroleum gas and kerosene, those values are estimated separately from the administrative data and added to petroleum products (commodity #27).

Since commodity-specific information on inventory balance in *Current Survey of Commerce* cannot be obtained for the estimation of the first QE, the total growth rates of commodity stocks of wholesale and retail are applied to the extrapolation of all the commodities.

After calculating the nominal inventory balance for wholesale and retail trade in such a way, inventory valuation adjustment is carried out, and change in inventories of wholesale and retail trade are estimated.

For Rice and wheat (commodity #1), the change in inventories is estimated separately from administrative data. For Crude petroleum and natural gas (commodity classification #10), crude oil unit price is multiplied by the increase in government-stockpiled oil. The crude oil unit price is derived from dividing import amount by imported volume from *Trade Statistics*, with an adjustment for the import duties.

5. Government Final Consumption Expenditure

Government final consumption expenditure is estimated as the sum of its components: Compensation for employees + Intermediate consumption + Consumption of fixed capital + Taxes imposed on production and imports – Sales of goods and services – Gross fixed capital formation on own account research & development + Social transfers in kind (purchase of

market output). Due to limited availability of source statistics, estimation is principally based on budget data, administrative information (obtained from interviewing), etc.

Compensation of employees is estimated based on the number of government employees and the payroll cost per employee. Regarding the number of government employees, the numbers of employees in public schools, police force, and Tokyo Metropolitan government are obtained on interviewing, and used as the basis for the overall development of the number of government employees. In the case that the third month value is unavailable, it is extrapolated by applying the average year-on-year change rate of the first and second month values to the previous year's third month value. As for the per-employee payroll cost, the previous fiscal year's payroll is estimated from *Statistical Report of Payroll Payment* (MIC) and is extrapolated considering the annual salary recommendations by National Personnel Authority to obtain the current fiscal year value. Then, the value is distributed to quarters taking into account the bonus months, etc.

As for "intermediate consumption" and "sales of goods and services," central government values for the current fiscal year are estimated based on budget data, and those of local governments for the current fiscal year are estimated using trends in the first QE, and trends and *Special Survey on Expenditure of Local Governments* (CAO) in the second QE. Those fiscal values are distributed to quarters using past quarterly patterns. For FISIM consumption, see I. 6.

"Consumption of fixed capital" of calendar year, which is estimated from year-end stock of fixed assets, is extrapolated by trend, and divided equally into 4 quarters.

"Taxes imposed on production and imports" of the current fiscal year are estimated from the budget data, etc., and are divided equally into 4 quarters.

For "gross fixed capital formation on own account research & development", see "6. Public fixed capital formation."

"Social transfers in kind (purchase of market output)" is composed of medical and nursing care benefits and others (school textbook expenses, contribution for free train/boat rides for wounded and sick retired soldiers). Medical care is roughly divided into the three categories of employed persons, unemployed persons and the elderly, and extrapolations are made for each of these categories using *Monthly Fund Statistics* (Health Insurance Claims Review & Reimbursement Services); *Survey on Medical Expense of National Health Insurance* (All-Japan Federation of National Health Insurance Organizations); and *Monthly Report on Workers' Accident Insurance* (MHLW). For nursing care, estimations are made using *Situation on Long-Term Care Benefit Expenses* and *Report on Situation of Long-term Care Insurance Service* (monthly), etc. For others (school textbook expenses, contribution for free train/boat rides for wounded and sick retired soldiers), annual values are estimated using trends and distributed to quarters. If data is not available for a certain month, it is estimated based on a year-on-year change rate of the months for which data is available.

6. Public Fixed Capital Formation

Public fixed capital formation (other than research & development, defense equipment, software) is divided into two categories of "public housing" and "other." "Public housing" and "others" are estimated by the change rates of residential buildings and other buildings, respectively, of the quarter in question compared to the previous fiscal year values in *Integrated Statistics on Construction Works (on a progress basis, public)*. Investments on research and development and defense equipment which are extrapolated by trends, and investment on computer software, which is derived from the supply-side estimation on software investment, are added to constitute public fixed capital formation.

In the first QE, the third month values from *Integrated Statistics on Construction Works* are not available. Thus, the third month value of "public housing" is extrapolated by previous two month average of year-on-year change rate, while that of "other" is extrapolated by using the predicted value from the regression of "the ratio of third month value to the sum of first and second month value" of *Integrated Statistics on Construction Works on* the 5 month moving average of the same ratio on public works projects contract amounts obtained from *Statistics on Public Works Advance Payment Guarantee* (Hokkaido Construction Surety Co., Ltd., East Japan Construction Surety Co., Ltd., West Japan Construction Surety Co., Ltd.).

Gross fixed capital formation on research and development by general government is extrapolated from the previous annual values estimated from *Survey of Research and Development* by trend and distributed to quarters based on the previous year's quarterly pattern. Research and development by public enterprises is estimated by proportionately dividing the market producers' data obtained from supply-side estimates with the share of public enterprises from the previous year. Gross fixed capital formation on defense equipment is extrapolated from the previous annual values estimated from several source statistics including government financial statement by trend and distributed to quarters based on the previous year's quarterly pattern. Computer software including customized software, packaged software and in-house software is estimated by supply-side statistics and proportionately divided using the share of public sector in software investment, which is derived from the matrix on gross fixed capital formation by industry in the latest *Input-Output Table*.

7. Change in Public Inventories

The major public inventories such as rice/wheat inventory of Special Account for Stable Food Supply, government-stockpiled crude oil, stockpiled liquefied petroleum gas and kerosene, and gold inventory in the reserve fund for collection of coins are estimated by using administrative data acquired on hearing to various government-related organizations. The change in other public inventories is assumed to be zero.

8. Exports and Imports

Exports and imports of goods and services are estimated from trade and service balance data in *Balance of Payment* with some adjustments. The results of annual revisions of *Balance of Payments*, which are carried out every year, are in principle reflected in the preliminary estimates to ensure national accounts data and balance of payment data to be consistent with each other. For FISIM exports and imports, see I. 6.

(Reference) Gross National Income (GNI)

Gross national income (GNI) is estimated by adding net income receivable from abroad (i.e. property income, compensation of employees, etc.), which is derived basically from *Balance of Payment*, to GDP. That said, the values of reinvested earnings on foreign direct investment in *Balance of Payment* are not the amount earned in the corresponding term for the most recent periods (due to a 17-month delay in the recording). Thus, reinvested earnings for these periods are extrapolated by trend from the value in the final month in which the value in *Balance of Payment* is recorded on accrual basis (that is, 17 months prior to the latest month).

III. Methodology for Deflation

1. Chain-Linking Method
(Basic formula for chain-linking method)
The chain-linking method is used for calculating real values and deflators in QE.
The basic formulas for the chain-linking method used in calculating component-specific deflators that will be explained in the next section are as follows.

Calendar year deflator: $CP_t = \dfrac{\sum_i P_t^i \cdot Q_t^i}{\sum_i P_{t-1}^i \cdot Q_t^i} \times CP_{t-1}$

Quarterly deflator: $CP_{t,k} = \dfrac{\sum_i P_{t,k}^i \cdot Q_{t,k}^i}{\sum_i P_{t-1}^i \cdot Q_{t,k}^i} \times CP_{t-1}$

Calendar year real value: $CV_t = \dfrac{\sum_i P_{t-1}^i \cdot Q_t^i}{\sum_i P_{t-1}^i \cdot Q_{t-1}^i} \times CV_{t-1}$

Quarterly real value: $CV_{t,k} = \dfrac{\sum_i P_{t-1}^i \cdot Q_{t,k}^i}{\sum_i P_{t-1}^i \cdot Q_{t-1}^i} \times CV_{t-1}$

$CP_{t,k}$: Deflator for the quarter k, year t (chain-linked)

$CV_{t,k}$: Real value for the quarter k, year t (chain-linked)

$P_{t,k}^i$: Price index of commodity i for the quarter k, year t

$Q_{t,k}^i$: Real value of commodity i for the quarter k, year t

(One-quarter overlap method)
When calculating real values, the one-quarter overlap method is used to link the estimate in every fourth quarter to prevent the gap in the quarter-on-quarter growth rate of the first quarter caused by difference in base year between October-December in year T and January-March in year T+1.

Quarterly real value by the one-quarter overlap method
$\dfrac{\sum_i P_{t-1}^i \cdot Q_{t,k}^i}{\sum_i P_{t-1}^i \cdot Q_{t-1,4}^i} \times CV_{t-1,4}$

Since this quarterly real value does not sum up to the calendar year value derived from the calendar year data (lack of additivity in time dimension), the released quarterly series is benchmarked to the calendar year value by proportional Denton method (formula below) using quarterly series by one-quarter overlap method. In every QE, the quarterly series are revised up to January-March in the calendar year of the Second Annual Estimates.

$$\min \sum_{t=2}^{T} \left[\frac{X_t}{I_t} - \frac{X_{t-1}}{I_{t-1}} \right]^2 \quad \text{s. t.} \quad \sum_{t=4y-3}^{4y} X_t = A_y \, (y = 1, \cdots, \beta)$$

- t: Quarter t, "4y – 3" denotes first quarter in calendar year y, while "4y" denotes fourth quarter in year y

- X_t: Quarterly value to be obtained

- I_t: Original quarterly value

- A_y: Calendar year value for benchmark year y

- β: Last year y in which benchmark A_y exists

- T: Last quarter t in which I_t exists

2. Final Consumption Expenditure of Households

First of all, for each item in the 88-purpose classification for final consumption expenditure of households, the purpose-specific chain deflator is calculated by using the commodity-specific deflator of the approximately 400-commodity categories in the commodity flow method that corresponds to nominal values of the detailed commodity category that is obtained by dividing the quarterly nominal value by the weight in Annual Estimates.

Then, the real value is calculated by dividing the nominal final consumption expenditure of household by the above purpose-specific deflator, for each item in the purpose classification. Since the nominal value of each parallel estimate item is calculated by integrating demand-side and supply-side estimates for the item, the real value of each item is calculated by dividing the integrated values of the item by corresponding deflators. For common estimate items, real values are calculated by dividing the nominal values estimated in the supply-side or the demand-side by corresponding purpose-specific deflators. For sales of goods and services, each commodity is deflated by corresponding index in *Consumer Price Index* and then classified and aggregated in accordance with the purpose classification. For deflators regarding direct purchases abroad by resident households and direct purchases in the domestic market by non-resident households, see "6. Exports and imports." The real value of total final consumption expenditure of household is obtained by chain-linking method integrating the real values and deflators of parallel estimate items, common estimate items, sales of goods and services, and direct purchases.

The deflator for total final consumption expenditure of household is obtained ex post (implicitly) by dividing the nominal value of total final consumption expenditure by the real value of total final consumption expenditure of household.

3. Final Consumption Expenditure of NPISH

The final consumption expenditure of NPISH is deflated for each of its components: compensation of employees, intermediate consumption, consumption of fixed capital, taxes on production and imports, sales of goods and services to other sectors (deductible items) and own account gross fixed capital formation related to research and development (deductible items). The real value of the total is derived by chain-linking method integrating, the real values and deflators of these components. The method of estimating the deflator for each component is described below.

For the deflator for compensation of employees, total cash earnings (establishment with five or more employees) is indexed for education and industry total by using *Monthly Labour Survey*. The intermediate consumption deflator is compiled by reorganizing the input commodities in the *Input-Output Table* in line with the approximately 400-commodity categories in the

commodity flow method and using these as weights to integrate the intermediate consumption deflators and construction repair works deflators.

The fixed capital consumption deflator is estimated from the gross fixed capital formation matrix.

For taxes on production and imports, the intermediate consumption deflator is used.
For the deflator for sales of goods and services, the corresponding deflator for final consumption expenditure of household is used.

The own account gross fixed capital formation deflator related to research and development is based on input cost and derived from the intermediate consumption deflator and contractual cash earnings index in *Monthly Labour Survey*.

4. Government Final Consumption Expenditure

Government final consumption expenditure is deflated for each of its components: compensation of employees, intermediate consumption, consumption of fixed capital, taxes on production and imports, sales of goods and services to other sectors (deductible items), own account gross fixed capital formation related to research and development (deductible items) and social transfers in kind (purchase of market output). The real value of the total is derived by chain-linking method integrating the real values and deflators of these components. The method of estimating the deflator for each component is described below.

With regard to the deflator for compensation of employees, the annual deflator is extrapolated in line with the average wage hike for public employees as recommended by the National Personnel Authority, and then converted into quarterly data taking into consideration the bonuses etc.

The intermediate consumption deflator is compiled by reorganizing the input commodities in the *Input-Output Table* in line with the approximately 400-commoditiy categories in the commodity flow method and using these as weights to integrate the intermediate consumption deflators and construction repair works deflators.

The fixed capital consumption deflator is estimated from the gross fixed capital formation matrix.

For taxes on production and imports, the intermediate consumption deflator is used.

For the deflator for sales of goods and services, the corresponding deflator for final consumption expenditure of household is used.

The own account gross fixed capital formation deflator related to research and development is based on input cost and derived from the intermediate consumption deflator and contractual cash earnings in *Monthly Labour Survey*.

Regarding social transfers in kind (purchase of market output), *Consumer Price Index* (medical care fees) is used for the medical care deflator, while changes in the portion paid by patients are deducted.

For the nursing care deflator, *Consumer Price Index* (nursing care fees) is used, while changes in the portion paid by users are deducted.

5. Gross Fixed Capital Formation
(1) Method for deflating gross fixed capital formation

The gross fixed capital formation is deflated by dividing the nominal value for each sector and residential/non-residential by the corresponding deflator. Aggregating these in line with the chain-linking method will yield the real values of items in published tables. The deflator for each published item is calculated by dividing the nominal value by the corresponding real value.

Deflators for gross fixed capital formation (by sector and residential/non-residential) are estimated by assigning the commodity-specific gross fixed capital formation deflator of the approximately 400-commodity categories in the commodity flow method in the case of machinery etc., while attributing construction deflators (for residential wooden buildings, non-residential wooden buildings, residential non-wooden buildings, non-residential non-wooden buildings and other buildings) in the case of the construction sector and compiling by the chain-linking method integrating these deflators with corresponding weights of sector and commodity estimated in the following procedure.

(a) Method for compiling construction deflators
Construction deflators are used for deflating the construction sector's output and intermediate consumption and gross fixed capital formation (construction portion). The following nine commodities are estimated: (1) "residential wooden buildings ," (2) "non-residential wooden buildings," (3) "residential non-wooden buildings," (4) "non-residential non-wooden buildings," (5) "construction repair works," (6) "other construction," (7) total for wooden buildings," ((1) and (2)), (8) "total for non-wooden buildings," ((3) and (4)) and (9) "total construction" ((1) to (6)) are estimated.

Figure 1: Quarterly Construction Matrix

	Wooden			Non-Wooden			Construction Repair Works	Other Construction
	Resi-dential	Non-Resi-dential	Total	Resi-dential	Non-Resi-dential	Total		
6-Digit Commodity in Commodity Flow Method	RAS (2)			RAS (2)				
Total Input Material	RAS (1)			RAS (1)				
Value Added								
Output								

Note: 1. Cells shaded light are calculated quarterly by the commodity flow method etc.
2. Cells shaded dark are calculated by allocating the output from the commodity flow method, based on the series obtained by converting *Building Starts Statistics* into accrual basis.
3. Cells labeled with "RAS (1)" are calculated by the RAS method allocating total input material and value added of wooden and non-wooden buildings into residential and non-residential.
4. Cells labeled with "RAS (2)" are calculated by the RAS method allocating the input material by commodity into residential and non-residential, using the total input material obtained in the procedure for "RAS (1)."

Construction deflators are based on input cost. The deflators are compiled with weights derived from the construction matrix of which columns are the above nine commodities and the rows are values of detailed input commodities estimated using the commodity flow method, etc. and the value added (compensation of employees). In the commodity flow method, the detailed inputs are not estimated as a matrix of by wooden/non-wooden and residential/non-residential, the detailed inputs are estimated by the RAS method based on *Input-Output Table*. The construction matrix is calculated every quarter.

Using the quarterly construction matrix (after the RAS method is applied) as a weight, the following formula gives the construction deflator by chain-linking method. It should be noted that for the value added portion, the compensation of employee deflated by the contractual cash earnings index (establishment with five or more employees belonging to the construction industry) from the *Monthly Labour Survey*. (When allocating compensation of employees to the residential or non-residential column, the share of total value-added after the RAS method is applied is used.)

$$D_{lk} = D_{lT-1} \cdot \frac{\sum_{i} n_{ik} + A_k}{\sum_{i} \left(\dfrac{\sum_{u=1}^{4} n_{iu}}{\sum_{u=1}^{4} \dfrac{n_{iu}}{d_{iu}}} \cdot \dfrac{n_{ik}}{d_{ik}} \right) + \left(\dfrac{\sum_{u=1}^{4} A_u}{\sum_{u=1}^{4} \dfrac{A_u}{d_{au}}} \cdot \dfrac{A_k}{d_{ak}} \right)}$$

D_{lk}:   Quarterly construction deflator (by construction sector (l))
k: Quarter k in year T
u: Quarter u in year T – 1
$n_{ik(u)}$:   Quarterly input materials by 6-digit commodity (i) in commodity flow method
$A_{k(u)}$:   Compensation of employees
$d_{ik(u)}$:   Quarterly intermediate consumption deflator for 6-digit commodity (i) in commodity flow method corresponding to $n_{ik(u)}$
$d_{ak(u)}$:   Contractual cash earnings index for construction industry (establishment with five or more employees)

(b) Method for compiling deflator for gross fixed capital formation
Gross fixed capital formation matrix
The gross fixed capital formation matrix is compiled quarterly by using the RAS method based on the original matrix corrected the fixed capital matrix estimated when compiling *Input-Output Table* in line with the concept in SNA.

The total of the column of this matrix is the quarterly gross fixed capital formation from supply-side estimates etc. divided based on the weight of sector in the Annual Estimates of the previous calendar year, while the total of the row is the gross fixed capital formation by commodity derived from quarterly supply-side estimates as well as the construction output level by five categories*.

  * In this context, "five categories" refer to residential wooden buildings, residential non-wooden buildings, non-residential wooden buildings, non-residential non-wooden buildings and other buildings.

Figure 2: Gross Fixed Capital Formation Matrix

	Private				Public				Total
	Non-Financial Corp. Non-Residential	Resi-dential	Financial Corp. Non-Residential	NPISH Non-Residential	Non-Financial Corp. Non-Residential	Resi-dential	Financial Corp. Non-Residential	General Government	
6-Digit Commodity in Commodity Flow Method									Com-modity Flow Method
Wooden-Residential Non-Wooden-Residential Wooden-Non-Residential Non-Wooden-Non-Residential Other-Construction	Allocated by RAS method								Com-modity Flow Method; *Building Starts Statis-tics*
Market Output									
Non-Market Output (Government)									Govern-ment R&D
Non-Market Output (NPISH)									NPISH R&D
Total Gross Fixed Capital Formation									

Note: Research and Development (R&D) is the only gross fixed capital formation output by non-market producers (Government, NPISH). It is recorded in their own sector (General Government, NPISH), as own-account gross capital formation.

Estimating gross fixed capital formation deflator
Using the quarterly gross fixed capital formation matrix that was obtained above as a weight, the gross fixed capital formation deflator is compiled as formula below based on the chain-linking method integrating the commodity-specific gross fixed capital formation deflators corresponding to the approximately 400-commodity categories in the commodity flow method and construction deflators.

$$D_{lk} = D_{lT-1} \cdot \frac{\sum_i n_{ik}}{\sum_i \left(\frac{\sum_{u=1}^{4} n_{iu}}{\sum_{u=1}^{4} \frac{n_{iu}}{d_{iu}}} \cdot \frac{n_{ik}}{d_{ik}} \right)}$$

D_{lk}:   Quarterly gross fixed capital formation deflator (by eight institutional sectors in the gross fixed capital formation matrix (l))

k: Quarter k of year T

u: Quarter u of year T – 1

$n_{ik(u)}$:   Quarterly gross fixed capital formation and construction output by commodity (i) in gross fixed capital formation matrix for each sector

$d_{ik(u)}$:　Quarterly gross fixed capital formation deflator and construction deflator for 6-digit level commodity in commodity flow method corresponding to $n_{ik(u)}$

(2) Remarks on deflating gross fixed capital formation data

As already explained in (1) above, the gross fixed capital formation deflators are calculated by chain-linking method integrating the deflators with the weight based on " each commodity's share to gross fixed capital formation of each sector" derived from two types of information: "goods and services allocated to gross fixed capital formation (commodity-specific information)" and "value by sector, such as investment by private non-financial corporations, private housing investment and general government investment etc. (sector-specific information)." When estimating quarterly series of these, quarterly information is used for "commodity-specific information," while annual (calendar year) information is used for "sector-specific information." Details are as follows.

For Annual Estimates, "each commodity's share to gross fixed capital formation of each sector" is estimated quarterly using the "commodity-specific information" of current quarter and "sector-specific information" of current calendar year. These are used as weights to estimate the quarterly deflators.

For quarterly preliminary estimates, "each commodity's share to gross fixed capital formation of each sector" is estimated using "commodity-specific information" of current quarter and "sector-specific information" of previous calendar year. These are used as weights to estimate the quarterly deflators.

6. Exports and Imports

First of all, the deflator for total exports and imports of goods and services is calculated. The quarterly nominal value of each item at the most detailed level for goods and services (i.e., the nominal original series for each quarter is divided using the approximately 400-commodity category information in the commodity flow method in the case of goods, and is divided into detailed components based on information for the base year in the case of services) is deflated by the corresponding commodity-specific deflator and the resultant real value is combined with the corresponding deflator to calculate the (chain-linked) real value for total exports and imports of goods and services.

The real value for overall exports and imports is calculated by chain-linking method integrating the exports and imports (chain-linked real value) for goods and services as calculated above and the corresponding implicit deflator, as well as the real value and deflator for direct purchases.

The deflator for direct purchases is as follows. For direct purchases in the domestic market by non-resident households, *Consumer Price Index* (all Japan; general excluding imputed rent) is used. For direct purchases abroad by resident households, *Consumer Price Index* (general) in the most popular four destination countries/regions among Japanese tourists based on *Trends in Number of Japanese Overseas Travelers* (JNTO) are converted based on the exchange rates, and are taken weighted average using the number of annual Japanese overseas travelers as a weight.

7. Gross Domestic Product (GDP)

Real Gross Domestic Product (expenditure approach) is obtained by aggregating the real values of components described above. Dividing nominal GDP by this value yields the GDP deflator (expenditure approach). Concretely, real GDP is aggregated by the following formula.

$$GDP_t = \frac{\sum P_{t-1} \cdot Q_t + \sum \overline{D}_{t-1} \cdot \Delta INV_t}{\sum P_{t-1} \cdot Q_{t-1} + \sum \overline{D}_{t-1} \cdot \Delta INV_{t-1}} \times GDP_{t-1}$$

P_t: Deflator by demand component in year t

Q_t: Real value by demand component in year t

$\overline{D}_t$:   Deflator for calendar-year average stock of inventories in year t

ΔINV_t: Real change in inventories in year t

8. Real Change in Inventories

Since change in inventories could be negative or zero, real balance of inventories (chain-linked) is calculated by type for private and by sector for public, and then converted into flow data. Private inventory is integrated from the 91-commodity classification level, while public inventory is integrated from the individual commodity level, both using the chain-linking method. Tables show the calendar-year average deflator for balance of inventories, which is implicitly calculated for the entire inventories both in the private and public sectors.

(1) Balance of Inventory: $INV_t = INV_{t-1} \times \dfrac{\sum \overline{D}_{i,t-1} Q_{i,t}}{\sum \overline{D}_{i,t-1} Q_{i,t-1}}$

$D_{i,t}^k$: Deflator for the end of quarter k in year t for commodity i

$\overline{D}_{i,t}$: (Calendar-year average deflator for balance of inventories) Annual average of deflator

$$\overline{D}_{i,t} = \frac{\sum D_{i,t}^k Q_{i,t}^k}{\sum Q_{i,t}^k}$$

$Q_{i,t}^k$: Change in Inventories for commodity i in quarter k of year t

(2) Flow of Inventories: $\Delta INV_t = INV_t - INV_{t-1}$

9. Method of Extrapolating Source Statistics

Among the price information such as price indices that serve as source statistics for deflators, for values for months of which information is not available yet when compiling QE, in principle, the latest available monthly values substitute them.

(Reference) Estimation methods for trading gains/losses, real GDI, real GNI
(1) Trading gains/losses are estimated for each quarter based on the formula below, using exports and imports of goods and services and the deflator for exports and imports. For seasonal adjustments, seasonally-adjusted series are used but the formula is the same as the original series.

$$\text{Trading gains/losses} = \frac{X - M}{P} - \left(\frac{X}{P_x} - \frac{M}{P_m} \right) \qquad ※\ P = \frac{X + M}{X_r + M_r}$$

X: Nominal exports, M: Nominal imports, P_x: Exports deflator, P_m: Imports deflator

Xr: Real exports, M: Real imports, P: Numeraire deflator

(2) Gross Domestic Income (GDI) is a sum of Trading gains/losses and real GDP.
(3) Gross National Income (GNI) is a sum of Net income from the rest of the world (real) and real GDI. Net income from the rest of the world is deflated by the domestic demand deflator.

IV. Compensation of Employees

Original series in nominal term is basically extrapolated by quarter-to-quarter change rate of the auxiliary series constructed from source statistics.

Original series in real term is estimated by dividing the nominal value by the deflator for household final consumption expenditure (excluding imputed rent and FISIM).

Nominal seasonally adjusted series is calculated as the sum of wages/salaries and employer's social contribution, both of which are seasonally adjusted using X12-ARIMA.

Real seasonally adjusted series is calculated by dividing nominal seasonally adjusted value by the seasonally adjusted deflator for household final consumption expenditure (excluding imputed rent and FISIM).

1. Wages and salaries

Wages and salaries for general industries (excluding public service) is extrapolated from the final quarter of the latest first Annual Estimates (i.e. Jan-Mar of the latest fiscal year). The auxiliary series is constructed as the quarter-to-quarter change rate in the number of employees multiplied by wages and salaries per employee, after adjusting the difference in the coverage between those source statistics and the Annual Estimates (e.g. the source information does not cover small size establishment data and directors' compensation). The number of employees is derived from *Labor Force Survey* (MIC) and wages and salaries per employee from *Monthly Labor Survey* (MHLW).

Wages and salaries of public service employees is extrapolated reflecting the pay revision caused by National Personnel Authority's annual salary recommendation, etc.

2. Employer's social contributions

(1) Employer's actual social contribution

Employer's actual social contribution is composed of compulsory actual social contribution to social security funds that is obligated to the employer by law or regulation (welfare pension, Japan Health Insurance Association, union-managed health insurance, mutual aid association, etc.) and voluntary actual social contribution where employers voluntarily contribute to pension funds (employers' contributions to employees' pension fund, defined-benefit corporate pension, etc.; includes lump-sum retirement allowance for which entitlement is recorded on accrual basis).

Employer's actual social contribution to social security funds is extrapolated from the latest first Annual Estimates (Jan-Mar quarter). The auxiliary series for the amount of contribution is estimated using the information on the development of insurance premium rates on various systems, *Labor Force Survey* and *Monthly Labor Survey*.

Employer's voluntary actual social contribution to pension funds is extrapolated from the latest first Annual Estimates (Jan-Mar quarter). The auxiliary series for the amount of contribution is

estimated using the information from relevant materials of various pension funds, *Labor Force Survey* and *Monthly Labor Survey*. The lump-sum retirement allowance recorded on accrual basis is extrapolated using the development in the employee turnover rate from *Monthly Labor Survey*.

(2) Employer's imputed social contribution

Employer's imputed social contribution on the defined benefit type corporate pension and lump-sum retirement allowance, for which the entitlement is recorded on accrual basis is estimated as the current service increase plus the output of relevant pension funds (i.e. service charges on pension scheme) minus employer's actual social contribution estimated as in (1), extrapolated from the latest first Annual Estimates.

The lump-sum retirement allowance for which the entitlement is not recorded on accrual basis (e.g. that for government employees) is assumed to be same as the latest first Annual Estimates. In addition, the public service-related accidents and liability insurance for workers' accidents, etc., are extrapolated from the latest first Annual Estimates (Jan-Mar quarter) by the auxiliary series reflecting *Labor Force Survey* and *Monthly Labor Survey*.

V. Seasonal adjustment

It is necessary to eliminate seasonal variation caused by climate, social convention or other factors, when quarterly data are used as a tool for evaluating business cycle. Seasonal adjustment in the QE adopts t "X-12-ARIMA" of Census Bureau in the U.S. Department of Commerce. In principle, adjusting outliers and level shifts, and selecting the degree of the moving average and auto regression in the ARIMA model are implemented during the compiling the First Annual Estimates, using the original series data from the first quarter (Jan-Mar) in 1994 to the latest quarter (Oct-Dec) of the Annual Estimates[4](For example, at the end of 2016 when compiling the First Annual Estimates of 2015, the original series from the first quarter in 1994 to the last quarter in 2015 are used).

For selecting an ARIMA model, the model that minimize AIC is selected for each nominal and real series. When calculating AIC, regression variables for adjusting the outliers and level shift, which were established beforehand, are used. Concretely, ARIMA models are selected using the following processes (regarding non-seasonal difference and seasonal difference of ARIMA models, we assume "1" for every series other than change inventories, and "0" for change inventories).

1-1. Adjustment of outliers and level shifts

With regard to adjusting outliers, dummy variables[5], which are statistically significant[6], are applied to the quarters where adjusting outlier and level shift is judged to be appropriate (or explicable in light of economic realities.

1-2. Adjustment for leap years

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[4] However, in the case that necessities of adjusting outlier are clear due to institutional factors such as an increase in the consumption tax rate or due to factors such as a conceptual change in source statistics, adjustment of outliers is carried out in the QE.

[5] Additive outliers (AO), temporary level change (TC), level shift (LS), and ramp effect (RP) are used as dummy variables representing outliers. The information of the dummy variables are published on occasion of the release of Annual estimates, together with the spec of the ARIMA model.

[6] The results of Outlier command in X12-ARIMA is used as references for judging statistical significance.

During the model selecting process carried out in compiling the First Annual Estimates as abovementioned, we judge whether the leap-year adjustment is necessary or not, based on the statistical adequacy test.

2. Selection of ARIMA model to minimize AIC

ARIMA models that minimize AIC are selected for each nominal and real series with incorporating dummy variables adopted in the process of 1-1 and 1-2. The orders in the AR part and MA part are assumed as ranging from 0 to 2 for both non-seasonal ARIMA models and seasonal ARIMA models. Accordingly, the models are selected from 81 patterns (i.e. from (0 1 0) (0 1 0) to (2 1 2) (2 1 2) for every series other than change in inventories and from (0 0 0) (0 0 0) to (2 0 2) (2 0 2) for change in inventories).

Using the ARIMA model selected from the abovementioned process, seasonal adjustments are carried out. The detailed settings are as follows.

The seasonal adjustment period (SPAN) is from the first quarter in 1994 to the most recent quarter. For the seasonal adjustment, a "partial concurrent strategy" is applied, from the viewpoint of reflecting the additional information on seasonal fluctuations brought by the latest data as soon as possible.[7] In this way, as seasonal adjustment is carried out each time of the QE compilation, the seasonally adjusted series are repeatedly revised back to the first quarter in 1994. The data period for estimating ARIMA models (MODELSPAN) is, in principle, the same as that of SPAN, that is, from the first quarter in 1994 to the latest quarter. Thus, even if the orders in ARIMA model remain unchanged, the parameter on each order change each time of the QE compilation.

As for the forecast periods based on the ARIMA model, the future forecast (MAXLEAD) period shall be for 8 quarters, in principle, taking into consideration the impacts of its setting on seasonal index. As quarterly series are available for more than 15 years, retracing forecast (MAXBACK) is not carried out.

The latest versions of ARIMA models for each component are published in the website of ESRI.

3. Seasonal adjustment for NPISHs final consumption and FISIM

With regard to the seasonal adjustment for final consumption expenditure of private non-profit institutions serving households (NPISHs), for both nominal and real series, the Annual Estimates are divided into quarters using the Lisman-Sandee method to achieve a smooth series, and this these data are used as seasonally adjusted series.

Seasonal adjustment is not applied to FISIM based on the result of the F-Test about seasonality in X12-ARIMA. Hence, the seasonal adjusted series for FISIM are same as the original series.

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[7] For the details of the partial concurrent adjustment, see IMF (2017) *Quarterly National Accounts Manual 2017 Edition*.

Annex 1 Distribution Ratio to Demand Components (derived from CY2015 Annual Estimates)

	91 category	Household Consumption	Gross Fixed Capital Formation
1	Rice and wheat	0.0000	0.0000
2	Other crop farming	0.5048	0.0034
3	Livestock farming	0.0802	0.0367
4	Agricultural services	0.0000	0.0000
5	Forestry	0.3235	0.0000
6	Fisheries	0.2671	0.0000
7	Metallic ores	0.0000	0.0000
8	Non-metallic ores	-0.0049	-0.0059
9	Coal and lignite	0.0000	0.0000
10	Crude petroleum and natural gas	0.0000	0.0000
11	Livestock food products	0.5700	0.0000
12	Seafood products	0.7304	0.0000
13	Flour and grain milled products	0.5121	0.0000
14	Agricultural products	0.8381	0.0000
15	Other foods	0.6071	0.0000
16	Beverages	0.6543	0.0000
17	Feeds and organic fertilizer	0.2442	0.0000
18	Tobacco	0.9468	0.0000
19	Chemical fibers	0.0000	0.0000
20	Spun yarns	0.0394	0.0000
21	Fabrics and other textile products	0.1148	0.0416
22	Apparel and clothing accessories	0.7438	0.0244
23	Pulp, paper and paper products	0.0453	0.0000
24	Basic chemical products	0.0026	0.0000
25	Drugs and medicines	0.1132	0.0000
26	Chemical final products	0.4398	0.0000
27	Petroleum products *1	(0.3514)	(0.0000)
28	Coal products	-0.0002	0.0000
29	Glass and glass products	0.0488	0.0000
30	Cement and cement products	0.0007	0.0000
31	Pottery, china and earthenware	0.0741	0.0000
32	Other ceramic, stone and cray products	0.0677	0.0000
33	Pig iron and crude steel	-0.0058	-0.0290
34	Steel products	0.0000	0.0000
35	Non-ferrous metals	0.0540	-0.0359
36	Non-ferrous metal products	0.0022	0.0564
37	Metal products for construction and architecture	0.0103	0.0063
38	Other metal products	0.0520	0.0281
39	General-purpose machinery	0.0016	0.5069
40	Production machinery	0.0023	0.7218
41	Business oriented machinery	0.0562	0.6218
42	Electrical components and devices *1	(0.0142)	(0.0000)
43	Industrial electric appliances	0.0007	0.4512
44	Household electric appliances	0.7997	0.0916
45	Other electric machinery, equipment and supplies	0.2183	0.4129
46	Communication equipment and its accessory equipment *1	(0.5321)	(0.3741)
47	Electronic computing equipment and its accessory equipment *1	(0.2381)	(0.7233)
48	Motor vehicles *1	(0.2334)	(0.1394)
49	Ships and its repair	0.0150	0.4772
50	Other transportation equipment and its repair	0.0420	0.3992
51	Lumber and wood products	0.0224	0.0032
52	Furniture and fixtures	0.1144	0.1193
53	Printing, plate making and book binding	0.0165	0.0000
54	Plastic products	0.0577	-0.0001
55	Rubber products	0.2531	0.0000
56	Leather, fur skins and other leather products	0.8416	0.0000
57	Other manufacturing	0.4366	0.1839
58	Electricity	*2	0.0000

	91 category	Household Consumption	Gross Fixed Capital Formation
59	Gas and heat supply	0.3696	0.0000
60	Water supply	*2	0.0000
61	Waste management service	0.0667	0.0000
62	Construction *1	(0.0000)	(0.8286)
63	Wholesale trade	0.1714	0.0000
64	Retail trade	0.7509	0.2491
65	Railway transport	0.6328	0.0000
66	Road transport	0.5731	0.0000
67	Water transport	0.0243	0.0000
68	Air transport	0.5680	0.0000
69	Other transport	0.3331	0.0000
70	Postal services and mail delivery	0.1183	0.0000
71	Hotels and other accommodations	0.6916	0.0000
72	Eating and drinking services	0.7109	0.0000
73	Communications	0.5550	0.0000
74	Broadcasting	0.3518	0.0000
75	Internet based services	0.1374	0.0000
76	Information services and image, sound, and character information production *1	(0.0930)	(0.3698)
77	Finance *1	(0.2812)	(0.0000)
78	Insurance *1	(0.7841)	(0.0000)
79	Real estate agencies and rental services	0.0323	0.0761
80	House rents	*2	0.0000
81	Research and development services	0.0000	1.0000
82	Advertising services	0.0006	0.0000
83	Goods rental and leasing	0.0878	0.0000
84	Other business services *1	(0.0228)	(0.0502)
85	Education	0.4402	0.0000
86	Medical, health care and welfare	*2	0.0000
87	Motor vehicle maintenance and machine repair services	0.1843	0.0000
88	Business membership organizations	0.0000	0.0000
89	Amusement and recreational services	0.7849	0.0000
90	Other personal services	0.8863	0.0000
91	Unable to classify	0.0000	0.0000

*1 Those categories are estimated by more detailed commodity level, and the figures in parentheses are the ratios calculated for aggregated levels *ex post*.

*2 Those categories are compiled in the demand side estimation as "common estimate items."

Annex 2 Regression formula used in the change in inventories estimation

(1) Materials and Supplies

parameter	0.690
t value	24.620

Adjusted R^2 0.863

(2) Work in Progress

parameter	0.886
t value	66.643

Adjusted R^2 0.969

(3) Wholesale and retail trade

Wholesale

parameter	0.290
t value	5.104

Adjusted R^2 0.219

Retail

parameter	0.508
t values	22.397

Adjusted R^2 0.841

Annex 3 Main source statistics used for QE estimates

A. Supply side estimation

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
1	Rice and wheat	Index Numbers of Commodity Price in Agriculture (MAFF)	Rice (Index Number of Commodity Price)	Late next month		3
		* Quantity is estimated by the Cabinet				
2	Other crop farming	Survey on Wholesale Markets of Vegetables and Fruits (MAFF)	Whole vegetables, Total of domestic fruits (wholesale value)			2
3	Livestock farming	Statistics on Meat Marketing (MAFF)	Pork, Japanese Beef cattle, Dairy cattle, First filial generation, and Other beef (Total traded value of dressed carcasses)	Late next month		6
		Statistics on Feeder Cattle Market (Agriculture & Livestock Industries Corporation)	Marketing head, Price in auction			
		Statistics on Milk and Dairy Products (MAFF)	Milk, unprocessed (production)	Late next month		
		Statistics on Chicken Eggs Marketing (MAFF)	Chicken eggs (Production)	Early May in the next year	B	
		Index Numbers of Commodity Price in Agriculture (MAFF)	Chicken eggs, Milk, unprocessed (Producer prices)	Late next month		
4	Agricultural services	Substituted by series of livestock farming				
5	Forestry	Statistics on Sawlogs (MAFF)	Domestic logs (arrivals)	Late next month		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Forestry products (Price index)	Early next month		
6	Fisheries	Statistics on Fishery Products at Landing Markets (Fisheries Agency)	Landed quantity, Market price at landing markets	Late next month		3
7	Metallic ores	Current Survey of Production (METI)	Mining, petroleum and coal products (Shipments)	Revised (middle of the month after next)	A	3
		Corporate Goods Price Index: Import Price Index (BOJ)	Metal materials (Price index)	Early next month		
8	Non-metallic ores	Current Survey of Production (METI)	Mining, petroleum and coal products (Shipments)	Revised (middle of the month after next)	A	6
		Indices of Industrial Production (METI)	Limestone (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Nonmetallic minerals (Price index)	Early next month		
9	Coal and lignite	Indices of Industrial Production (METI)	* Quantity is estimated by the Cabinet Office.	Preliminary (late next month) Revised (middle of the month after		6
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Coal products (Price index)	Early next month		
10	Crude petroleum and natural gas	Indices of Industrial Production (METI)	Crude oil, Natural gas (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
		Corporate Goods Price Index: Import price index (BOJ)	Crude petroleum (Price index)	Early next month		
11	Livestock food products	Indices of Industrial Production (METI)	Meat products, Dairy products (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)	E	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Meat products, dairy products (Price index)	Early next month		
12	Seafood products	Food Industry Change Survey (MAFF)	Processed foodstuffs of fishery products (production)	Early month after next	A	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Processed fishery products (Price index)	Early next month		
13	Flour and grain milled products	Food Industry Change Survey (MAFF)	Cereal flour, the processed products using cereal flour (production)	Early month after next	A	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Grain mill products, Flour products (Price index)	Early next month		
14	Agricultural products	Food Industry Change Survey (MAFF)	Processed foodstuffs of vegetables and fruits (production)	Early month after next	A	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Processed agriculture products (Price index)	Early next month		
15	Other foods	Indices of Industrial Production (METI)	Oils and fats, seasoning (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after	E	6
		* Quantity is estimated by the Cabinet Office. (except oils, condiments and seasoning)				
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Animal & vegetable oils and fats, Seasonings, Other prepared & preserved foodstuffs (Price index)	Early next month		
16	Beverages	Indices of Industrial Production (METI)	Alcohol, Beverages (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after	E	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Alcoholic beverages, Soft drinks (Price index)	Early next month		
17	Feeds and organic fertilizer	Survey of commercial feed prices, etc. (MAFF)	Production Total (Production)	Late month after next	A	3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Feedstuffs (Price index)	Early next month		
18	Tobacco	Japanese Domestic Cigarette Monthly Sales Results (Preliminary Report) (Japan Tobacco Inc.)	Sales Volume	Early next month		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Tobacco products (Price index)	Early next month		
19	Chemical fibers	Indices of Industrial Production (METI)	Chemical fiber (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Yarn of chemical fibers (Price index)	Early next month		
20	Spun yarns	Indices of Industrial Production (METI)	Spun yarn (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Raw yarn (Price index)	Early next month		
21	Fabrics and other textile products	Indices of Industrial Production (METI)	Woven fabrics, Dyeing and finishing processes, Other textile products (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Woven & knitted fabrics, Other textile products (Price index)	Early next month		
22	Apparel and clothing accessories	Indices of Industrial Production (METI)	Clothes (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Apparel (Price index)	Early next month		
23	Pulp, paper and paper products	Current Survey of Production (METI)	Pulp, paper and paper products (Sales Value)	Revised (middle of the month after next)	D	2
24	Basic chemical products	Current Survey of Production (METI)	Chemical industry (Sales Value)	Revised (middle of the month after next)	D	2
25	Drugs and medicines	Indices of Industrial Production (METI)	Chemicals, Chemicals (excl. Drugs) (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)	E	6
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Pharmaceutical products (Price index)	Early next month		
26	Chemical final products	Current Survey of Production (METI)	Chemical industry (Sales Value)	Revised (middle of the month after next)	D	2
27	Petroleum products	Indices of Industrial Production (METI)	Gasoline, Jet fuel, Kerosene, Gas oil, Heavy fuel oil A, Heavy fuel oil B C, Naphtha, Liquefied petroleum gas, Petroleum products (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)		3
	(subcategories estimated)	Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Gasoline, Jet fuel oil, Kerosene, Gas oil, Fuel oil A, Fuel oil C, Naphtha, Liquefied petroleum gas, Lubricating oil, Other petroleum products (Price index)	Early next month		
28	Coal products	Indices of Industrial Production (METI)	Coal products (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Coal products (Price index)	Early next month		
29	Glass and glass products	Current Survey of Production (METI)	Ceramics and building materials (Sales Value)	Revised (middle of the month after next)	D	2

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
30	Cement and cement products	Current Survey of Production (METI)	Ceramics and building materials (Sales Value)	Revised (middle of the month after next)	D	2
31	Pottery, china and earthenware	Current Survey of Production (METI)	Ceramics and building materials (Sales Value)	Revised (middle of the month after next)	D	2
32	Other ceramics, stone and cray products	Current Survey of Production (METI)	Ceramics and building materials, Chemical industry (Sales Value)	Revised (middle of the month after next)	D	2
33	Pig iron and crude steel	Indices of Industrial Production (METI)	Crude steel (incl. Semi-finished steel) (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Ferro-alloys, Pig iron (Price index)	Early next month		
34	Steel products	Indices of Industrial Production (METI)	Hot rolled steel, Steel pipes and tubes, Cold finished steel, Metallic coated steel, Steel castings and forgings (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Hot rolled ordinary steel products, Cold finished & coated ordinary steel products, Hot rolled special steel products, Cold finished special steel products, Steel pipes & tubes, Cold finished bars, wires, cast iron pipes & tubes, Other iron & steel products (Price index)	Early next month		
35	Non-ferrous metals	Indices of Industrial Production (METI)	Refining of non-ferrous metals (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Unwrought metals (Price index)	Early next month		
36	Non-ferrous metal products	Indices of Industrial Production (METI)	Copper and copper-base alloys and aluminum rolling products, Electric wires and cables, Non-ferrous metal castings (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after next)		3
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Nonferrous metal rolled & extruded products, Electric wires & cables, Other nonferrous metals (Price index)	Early next month		
37	Metal products for construction and architecture	Current Survey of Production (METI)	Ceramics and building materials (Sales Value)	Revised (middle of the month after next)	D	2
38	Other metal products	Current Survey of Production (METI)	Non-ferrous metals, Other products (Sales Value)	Revised (middle of the month after next)	D	2
39	General-purpose machinery	Current Survey of Production (METI)	General-purpose, production and business oriented machinery (Production or Sales Value)	Revised (middle of the month after next)	D	2
40	Production machinery	Current Survey of Production (METI)	General-purpose, production and business oriented machinery (Sales Value)	Revised (middle of the month after next)	D	2

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
41	Business oriented machinery	Current Survey of Production (METI)	General-purpose, production and business oriented machinery (Sales Value)	Revised (middle of the month after next)	D	2
42	Electronic components and devices (subcategories estimated)	Current Survey of Production (METI)	Electrical machineries, Electronic devices, Information and Communication equipments (Sales Value)	Revised (middle of the month after next)	D (partly A)	2
43	Industrial electric appliances	Current Survey of Production (METI)	Electrical machineries, Electronic devices, Information and Communication equipments (Production or Sales Value)	Revised (middle of the month after next)	D	2
44	Household electric appliances	Current Survey of Production (METI)	General-purpose, production and business oriented machinery Electrical machineries, Electronic devices, Information and Communication equipments (Sales Value)	Revised (middle of the month after next)	D	2
45	Other electrical machinery, equipment and supplies	Current Survey of Production (METI)	Electrical machineries, Electronic devices, Information and Communication equipments (Production or Sales Value)	Revised (middle of the month after next)	D	2
46	Communication Equipment and its accessory equipment (subcategories estimated	Current Survey of Production (METI)	Electrical machineries, Electronic devices, Information and Communication equipments (Production or Sales Value)	Revised (middle of the month after next)	D (partly A)	2
47	Electronic computing equipment and its accessory equipment (subcategories estimated	Current Survey of Production (METI)	Electrical machineries, Electronic devices, Information and Communication equipments (Production Value)	Revised (middle of the month after next)	D	2
48	Motor vehicles (subcategories estimated	Current Survey of Production (METI)	Transport equipment (Sales Value)	Revised (middle of the month after next)	D	2
49	Ships and its repair	Indices of Industrial Production (METI)	Ships and ship engines (Original Shipments Indices) *Basic unit deflators estimated by Cabinet Office are used as price indices.	Preliminary (late next month) Revised (middle of the month after next)		3
50	Other transportation equipment and its repair	Current Survey of Production (METI)	Transport equipment (Sales Value)	Revised (middle of the month after next)	A	2
51	Lumber and wood products	Current Survey of Production (METI)	Ceramics and building materials (Sales Value)	Revised (middle of the month after next)	A	6
		Statistics on Sawlogs (MAFF)	Lumber (Shipments)	Early next month		
		Statistics on Plywood (MAFF)	Common plywood, Specialty plywood (Shipments)	Early next month		
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Timber, Ordinary plywood, Special plywood (Price index)	Early next month		
52	Furniture and fixtures	Current Survey of Production (METI)	Other products (Sales Value)	Revised (middle of the month after next)	A	2
53	Printing, plate making and book binding	Indices of Industrial Production (METI)	Printing (Original Shipments Indices)	Preliminary (late next month) Revised (middle of the month after		3

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
		Domestic Corporate Goods Price Index: Producer Price Index (BOJ)	Printed matter & engravings (Price index)	Early next month		
54	Plastic products	Current Survey of Production (METI)	Rubber and plastic products (Sales Value)	Revised (middle of the month after next)	D	2
55	Rubber products	Current Survey of Production (METI)	Rubber and plastic products (Sales Value)	Revised (middle of the month after next)	D	2
56	Leather, fur skins and other leather products	Current Survey of Production (METI)	Other products (Sales Value)	Revised (middle of the month after next)	A	2
57	Other manufacturing	Current Survey of Production (METI)	General-purpose, production and business oriented machinery, Other products (Sales Value)	Revised (middle of the month after next)	D	2
58	Electricity	Electric Power Statistics (Agency for Natural Resources and Energy)	Electric power generation record *Basic unit deflators estimated by Cabinet Office are used as price indices.	Late third month	A	3
59	Gas and heat supply	Current Survey of Gas Production (Agency for Natural Resources and Energy)	Gas production and purchases *Basic unit deflators estimated by Cabinet Office are used as price indices.	Late month after next	A	3
60	Water supply		See the "B. Estimates on Demand Components" section.			5
61	Waste management service	Monthly Survey on Service Industries (MIC)	Waste disposal business (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
62	Construction (subcategories estimated	Integrated Statistics on Construction Works (MLIT)	Total of Building, Building built of wood, Total of Civil Engineering (Quick Estimate of Construction Investment)	Middle of the month after next	A	6
63	Wholesale trade	Current Survey of Commerce (METI)	Commercial sales value by type of business (wholesale)	Preliminary (late next month) Revised (middle of the month after		4
		Financial Statements Statistics of Corporations by Industry (Quarterly survey) (MOF)	Wholesale (sales, cost of sales)	Early third month	C	
64	Retail trade	Current Survey of Commerce (METI)	Commercial sales value by type of business (retail)	Preliminary (late next month) Revised (middle of the month after		4
		Financial Statements Statistics of Corporations by Industry (Quarterly survey) (MOF)	Retail (sales, cost of sales)	Early third month	C	
65	Railway transport	Monthly Survey on Service Industries (MIC)	Railway transport (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
66	Road transport	Monthly Survey on Service Industries (MIC)	Road passenger transport, Road freight transport (Sales)	Preliminary (late month after next) Revised (5 month later)	A	2
67	Water transport	Monthly Survey on Service Industries (MIC)	Water transport (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
68	Air transport	Statistical Report on Air Transport (MLIT)	International cargo, Domestic scheduled cargo, International passenger, Domestic scheduled passenger	Late month after next	A	6

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
		Services Producer Price Index (BOJ)	International air freight transportation, Domestic air freight transportation, International air passenger transportation, Domestic air passenger transportation (Price index)	Late next month		
69	Other transport	Status of handling by major travel agents (Japan Tourism Agency)	Total proceeds	Early month after next	A	6
		Monthly Survey on Service Industries (MIC)	Warehousing, Services incidental to transport (Sales)	Preliminary (late month after next) Revised (5 month later)	A	
70	Postal services and mail delivery	Volume of items handled (Japan Post Co., Ltd.)	Total volume of items handled *Basic unit deflator estimated by Cabinet Office is used as a price index.		A	3
71	Hotels and other accommodations	Monthly Survey on Service Industries (MIC)	Accommodations (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
72	Eating and drinking services	Monthly Survey on Service Industries (MIC)	Eating and drinking places, Food take out and delivery services (Sales)	Preliminary (late month after next) Revised (5 month later)	A	2
73	Communications	Monthly Survey on Service Industries (MIC)	Communications (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
74	Broadcasting	Monthly Survey on Service Industries (MIC)	Broadcasting (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
75	Internet based services	Survey of Selected Service Industries (METI)	Internet-related Services Industry (Sales)	Revised (middle of the month after next)	A	1
76	Information services and image, sound, and character information production	Survey of Selected Service Industries (METI)	Information Service Industry (Total, Orders for Software, Software Products) (Sales)	Revised (middle of the month after next)	A	6
	(subcategories estimated	Monthly Survey on Service Industries (MIC)	Video picture, sound information, character information production and distribution (Sales)	Preliminary (late month after next) Revised (5 month later)	A	
77	Finance	Monthly statistics report (Tokyo Stock Exchange)	Trading Value (All Stock Exchanges)	Early next month		6
	(subcategories estimated	Flow of Funds (BOJ)	Financial Assets and Liabilities (loans, deposits)	Late third month		
		Principal Figures of Financial Institutions (BOJ)	Amounts of Loans and Discounts	Late next month		
		Average Contract Interest Rates on Loans and Discounts (BOJ)	Interest Rates on Loans and Discounts	Late next month ~ early month after next		
		Average Interest Rates Posted at Financial Institutions by Type of Deposit (BOJ)	Interest Rates on Deposits	Next week		

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
		Deposits, Vault Cash, and Loans and Bills Discounted (BOJ)	Amounts of Deposits	Late next month ~ early month after next		
		Average Interest Rates on Time Deposits by Term (BOJ)	Interest Rates on Deposits	Middle of the month after next		
		Time Deposits: Amounts Outstanding and New Deposits by Maturity (BOJ)	Amounts of Deposits	Middle of the month after next		
78	Insurance (subcategories estimated)	Information from the Life Insurance Association of Japan	Pension fund, etc.	3 months later	A	6
		Statistics on the number of motor vehicles owned (MLIT)	Number of motor vehicles owned	Early third month	A	
		Consumer Price Index (MIC)	Automotive insurance premium (compulsion, option) (Price index)	Late next month		
79	Real estate agencies and rental services	Monthly Survey on Service Industries (MIC)	Real estate agencies (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
80	House rents		See the "B. Estimates on Demand Components" section.			5
81	Research and development services	Survey on Planned Capital Spending (DBJ)	Planned R&D expenditure			6
		Financial Statements Statistics of Corporations by Industry (Annual survey) (MOF)	Sales, Operating profits	September in the next year		
82	Advertising services	Survey of Selected Service Industries (METI)	Advertising Industry (Sales)	Revised (middle of the month after next)	A	1
83	Goods rental and leasing (except real estate rental services)	Monthly Survey on Service Industries (MIC)	Goods rental and leasing (Sales)	Preliminary (late month after next) Revised (5 month later)	A	6
		Balance of Payments Statistics (BOJ, MOF)	Charges for the use of industrial property n.i.e. (credit)	Early month after next	A	
84	Other business services	Survey of Selected Service Industries (METI)	Engineering Industry (Sales)	Revised (middle of the month after next)	A	6
		Monthly Survey on Service Industries (MIC)	Professional services, Employment and worker dispatching services, Miscellaneous business services (Sales)	Preliminary (late month after next) Revised (5 month later)	A	
85	Education	Monthly Survey on Service Industries (MIC)	Miscellaneous education, learning support (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
86	Medical, health care and welfare		See the "B. Estimates on Demand Components" section.			5

No.	91-category	Name of Statistics	Summary of Source Statistics Used for Estimates	Release Schedule	Method of Extrapolation for Missing Months	Pattern of Estimation
87	Motor vehicle maintenance and machine repair services	Monthly Survey on Service Industries (MIC)	Automobile maintenance services (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
88	Business membership organizations		The latest First Annual Estimates is used (after dividing it by four).			6
89	Amusement and recreational services	Monthly Survey on Service Industries (MIC)	Services for amusement and hobbies (Sales)	Preliminary (late month after next) Revised (5 month later)	A	1
90	Other personal services	Survey of Selected Service Industries (METI)	Funeral Services, Wedding Ceremony Halls (Sales)	Revised (middle of the month after next)	A	6
		Monthly Survey on Service Industries (MIC)	Laundry, beauty and bath services, Education, learning support of which supplementary tutorial schools and instruction service for arts, culture and technicals (Sales)	Preliminary (late month after next) Revised (5 month later)	A	
91	Unable to classify		The latest First Annual Estimates is used (after dividing it by four).			6

Note: "Release Schedule" is only for the statistics of which release dates are publicly announced.

Patterns of estimation on shipments

1	One series is directly used as an auxiliary series.
2	The auxiliary series is introduced by summing up two or more series.
3	The auxiliary series is calculated as a product of quantity and price (index).
4	The auxiliary series is calculated as "((Sales - Cost of sales) / Sales) × Commercial sales value."
5	Estimation is performed from demand-side.
6	Another method such as combination of above ones.

Methods of extrapolation for missing months

A	Year-over-year change rate of the first 1 or 2 months is used as that of the missing months.
B	Values of the same quarter in the preceding year are used.
C	The latest 4-quarter average of the margin rates of "Financial Statements Statistics of Corporations by Industry (Quarterly survey)"is
D	Quarter-over-quarter change rate of series made by similar items of IIP and CGPI is used as that of the missing month.
E	The value in the second month is multiplied by quarter-over-quarter change of the third month in the previous year.

B. Demand component estimation

1. Private Consumption

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Domestic final consumption expenditure of households	Family Income and Expenditure Survey (MIC)	For demand-side estimates (per-commodity allocation rate of two-or-more-person and one-person households)	All households: late next month	
	Survey of Household Economy (MIC)	For demand-side estimates (per-commodity allocation rate of two-or-more-person and one-person households)	All households: early month after next	
	National Survey of Family Income and Expenditure (MIC)	For demand-side estimates (consumption per household of two-or-more-person and one-person households)	Every five years	
	Population Estimates (MIC)	For demand-side estimates (number of households)	Approximate values: late same month; Revised values: about 5 months after	
	Population Census (MIC)	For demand-side estimates (number of households)	Every five years	
	Consumer Price Index (MIC)	For estimate of house rents and deflation of Sales of goods and services by general government	Late next month	
	Building Starts (MLIT)	For estimate of house rents	Late next month	
	Buildings Loss Statistics Survey (MLIT)	For estimate of house rents	Late third month	
	Statistics on Building Disaster (MLIT)	For estimate of house rents	Late third month	
	Housing and Land Survey (MIC)	For estimate of house rents	Every five years	
	Housing Starts (MLIT)	For estimate of imputed rent	Late next month	
	Flash estimate of medical expense in National Health Insurance and medical care for elderly in the latter stage of life (All-Japan Federation of National Health Insurance Organizations)	For estimate of medical services	About four months later	Estimated with past trend
	Monthly Report (Health Insurance Claims Review & Reimbursement services)	For estimate of medical services	Late month after next	Estimated with past trend
	Survey on Long-term Care Benefits (All-Japan Federation of National Health Insurance Organizations)	For estimate of nursing services covered by Long-Term Care Insurance	About four months later	Estimated with past trend
	Report on Long-Term Care Insurance Project (MHLW)	For estimate of nursing services covered by Long-Term Care Insurance	About six months later	Estimated with past trend

1. Private Consumption (cont'd)

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Direct purchases abroad by resident households, Direct purchases in the domestic market by non-resident households	Balance of Payments Statistics (BOJ, MOF)	For estimate of relevant items	Preliminary: middle of the month after next; Revised: middle of the fourth month	
	Consumption Trend Survey for Foreigners Visiting Japan (Japan Tourism Agency)	For estimate of domestic final consumption expenditure of households from demand-side	End of next month	

2. Private Residential Investment

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Private residential investment	Building Starts (MLIT)	For estimate of overall housing investment	Late next month	

3. Private Non-Residential Investment

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Private non-residential investment	Financial Statements Statistics of Corporations by Industry (Quarterly survey) (MOF)	For estimate of private non-residential investment from demand-side for second QE (non-financial corporations and financial corporations)	Beginning of third month	
	Financial Statements Statistics of Corporations by Industry (Annual survey) (MOF)	For estimate of private non-residential investment from demand-side for second QE (non-financial corporations)	September in the next year	
	Unincorporated Enterprise Survey (MIC)	For estimate of private non-residential investment from demand-side for second QE (unincorporated enterprises)	Middle of the month after next	
	Labour Force Survey (MIC)	For estimate of private non-residential investment from demand-side for second QE (unincorporated enterprises)	Late next month	
	Census of Agriculture and Forestry (MAFF)	For estimate of private non-residential investment from demand-side for second QE (unincorporated enterprises)	Every five years	
	Survey on Movement of Agricultural Structure (MAFF)	For estimate of private non-residential investment from demand-side for second QE (unincorporated enterprises)	Late June (except years with Census of Agriculture and Forestry)	
	Building Starts (MLIT)	For estimate of private non-residential investment from demand-side for second QE (unincorporated enterprises)	Late next month	

4. Change in Private Inventory

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Change in private inventory	Financial Statements Statistics of Corporations by Industry (Annual survey) (MOF)	For benchmark of Materials and supplies and Work-in-progress	September in the next year	
	Financial Statements Statistics of Corporations by Industry (Quarterly survey) (MOF)	For estimate of Materials and supplies and Work-in-progress	Early third month	Forecast by X-12-ARIMA is used for 1st QE
	Preliminary Report on Petroleum Statistics (Agency for Natural Resources and Energy)	For estimate of Materials and supplies (Crude petroleum and natural gas)	Preliminary: late next month; Revised: middle of the month after next	
	Trade Statistics (MOF)	For estimate of Materials and supplies (Crude petroleum and natural gas)	Preliminary: late next month; Revised: late month after next	
	Economic Census for Business Activity (MIC, METI)	For benchmark of Finished goods and Wholesale and retail trade	Every five years	
	Census of Manufacture (METI)	For benchmark of Finished goods	Two years later (except years of Economic Census for Business Activity)	
	Indices of Industrial Production (METI)	For estimate of Finished goods	Preliminary: late next month; Revised: middle of the month after next	The value in the second month is multiplied by quarter-over-quarter change of the third month in the previous year.
	Food Industry Change Survey (MAFF)	For estimate of Finished goods	Early month after next	The value in the second month is multiplied by quarter-over-quarter change of the third month in the previous year.
	Survey on Rice Stock, etc. of Producers (MAFF)	For estimate of Finished goods (Rice and wheat)	July and November, etc.	Values of the same quarter in the preceding year are used.
	Census of Agriculture and Forestry (MAFF)	For estimate of Finished goods (Rice and wheat)	Every five years	Values of the same quarter in the preceding year are used.
	Survey on Movement of Agricultural Structure (MAFF)	For estimate of Finished goods (Rice and wheat)	Late June (except years with Census of Agriculture and Forestry)	Values of the same quarter in the preceding year are used.
	Index Numbers of Commodity Price in Agriculture (MAFF)	For estimate of Finished goods (Rice and wheat)	Late next month	
	Current Survey of Commerce (METI)	For estimate of Wholesale and retail trade	Preliminary: late next month; Revised: middle of the month after next	For 1st QE estimate, inventory by commodity in the previous quarter is multiplied by quarter-to-quarter change of Total commodity stocks.
	Industrial Financial Databank (Development Bank of Japan)	Weights of inventory valuation method is used for inventory valuation adjustment	April in the next year	

5. Government Consumption

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Government consumption	*hearing survey from relevant agencies*	For estimate of Compensation of Employees	(Hearing: late month after next)	Year-over-year change rate of the first 2 months is used as that of the missing month.
	National Personnel Authority Remuneration Recommendation (National Personnel Authority)	For estimate of Compensation of Employees	Mid-August of the year	
	Research on Consumption of Local Governments (Cabinet Office)	For estimate of Intermediate consumption and Sales of goods and services by general government	(Data aggregation: Late month after next)	Estimated with past trend, etc.
	Flash estimate of medical expense in National Health Insurance and medical care for elderly in the latter stage of life (All-Japan Federation of National Health Insurance Organizations)	For estimate of medical services	About four months later	Estimated with past trend
	Monthly Report (Health Insurance Claims Review & Reimbursement services)	For estimate of medical services	Late month after next	Estimated with past trend
	Survey on Long-term Care Benefits (All-Japan Federation of National Health Insurance Organizations)	For estimate of nursing services covered by Long-Term Care Insurance	About four months later	Estimated with past trend
	Report on Long-Term Care Insurance Project (MHLW)	For estimate of nursing services covered by Long-Term Care Insurance	About six months later	Estimated with past trend

6. Public Investment

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Public investment	Integrated Statistics on Construction Works (MLIT)	For estimate of relevant items	Late month after next	
	Public Works Prepayment Surety Statistics (Surety Companies Association)	For extrapolation of missing-month in the Integrated Statistics on Construction Works with Public work contract value	Middle of the next month	

7. Change in Public Inventory

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Change in public inventory	*hearing survey from relevant agencies*	For estimate of relevant items	(Hearing: late next month)	

8. Exports and Imports

Estimated Component	Name of Statistics	Summary of Usage	Release Schedule	Method of Extrapolation for Missing Months
Exports and Imports	Balance of Payments Statistics (BOJ, MOF)	For estimate of relevant items	Preliminary: middle of the month after next; Revised: middle of the fourth month	
	Trade Statistics (MOF)	For estimate of deflator for goods trade	Revised exports: late next month; Imports(details):late next month; Revised imports: late month after next	