Evolution of Consumption Statistics Driven by Big Data

- An Example from Ministry of Internal Affairs and Communications, JAPAN -

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Structure of Consumption Trend Index (CTI)

- Japanese government has conducted Family Income and Expenditure Survey (FIES) since 1950. Its purpose is **to investigate the structure of household budget**. On the other hand, market players and investors have used the statistics produced by FIES **to grasp the trend of the consumption and predict the economic performance of Japan**.

- **Consumption Trend Index (CTI)** comprises: timely macro trend (**Total Consumption Trend Index**) mainly for market players; coverall micro trend (**Household Consumption Trend index**) mainly for researchers; and others.
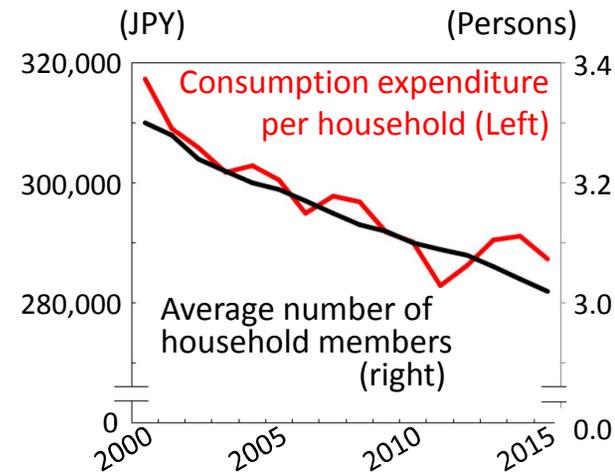
Consumption Trend Index
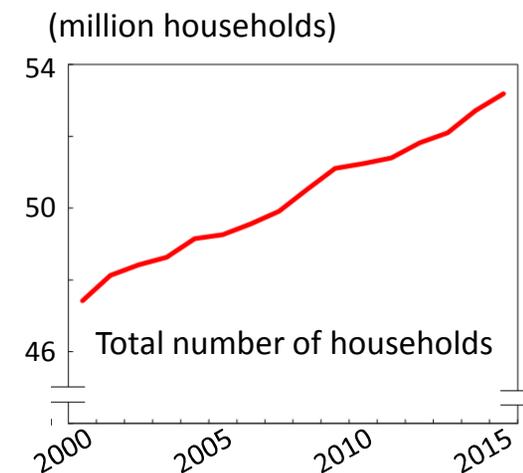
① Total Consumption Trend Index

Estimating the monthly trend of Household Final Consumption Expenditure of SNA by applying the state space model

② Household Consumption Trend Index

Estimating the monthly trend of Household Expenditure by enhancing the data from FIES

③ Other Consumption Trend

Estimating the amount of gifts from companies to clients and customers (Japanese traditional business custom) and consumption of foreign visitors, etc. by using Big Data
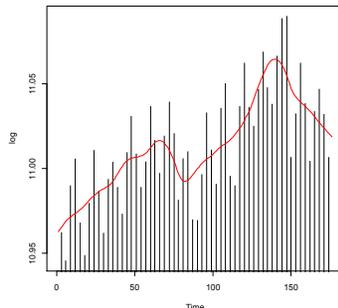
Outline of Total Consumption Trend Index

- The consumption trend of an **entire society** is estimated by using time series analysis (**the state space model**).
- **Timely** estimation was achieved by adding Big Data (utilized through the bias correction) to the data sources.
- **CTI Research Consortium** launched on 28 July 2017 to promote the use of Big Data generated by private sectors.

Estimation by Using the State Space Model

- By applying **the state space model**, one of the techniques of time series analysis, **the final consumption expenditure of households,** one part of GDP, is estimated as Total Consumption Trend Index.
- Total Consumption Trend Index is estimated **monthly**, while GDP itself is estimated quarterly.
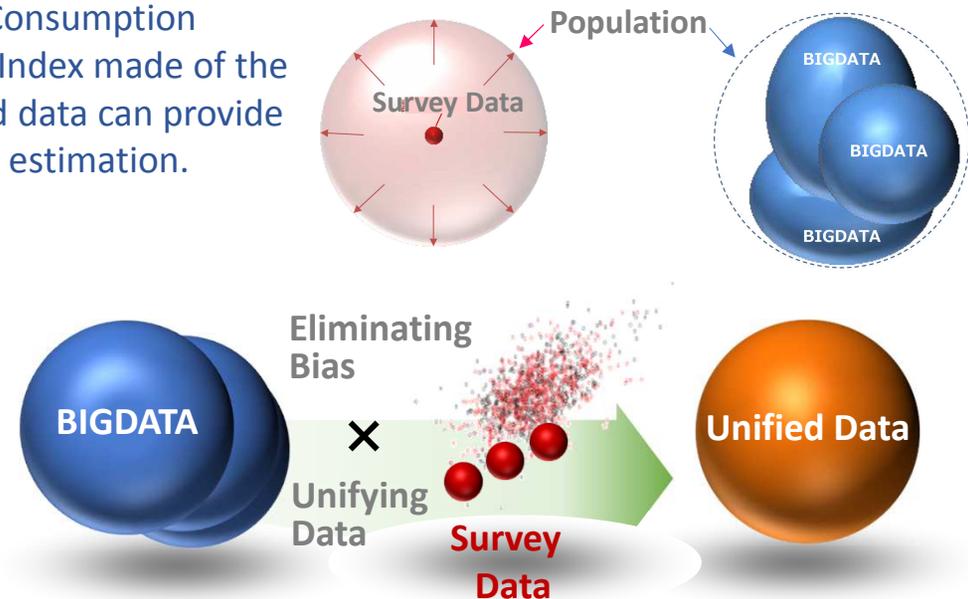
$$x_t = Fx_{t-1} + Gv_t$$
$$y_t = Hx_t + u_t$$

Eliminating Bias and Unifying the Various Kind of Big Data

- **Survey data** can be utilized for elimination of the bias of Big Data and can unify some Big Data from various resources.
- Total Consumption Trend Index made of the unified data can provide **timely** estimation.

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Outline of Household Consumption Trend Index

- **Expenditure Monitor Survey for One-Person Households** launched on Aug. 2017. FIES was improved on Jan. 2018.
- Household Consumption Trend Index has been developed as a comprehensive statistics covering entire household consumption by using **FIES**, **FIES for Expensive Items** and **Expenditure Monitor Survey for One-Person Households**.
- Accuracy of Household Consumption Trend Index will be improved when Big Data is practically available.

Improvement of FIES

- **Online diary**, enhancement of the measurement of **cashless transaction** and other improvement of FIES were adopted on January 2018.

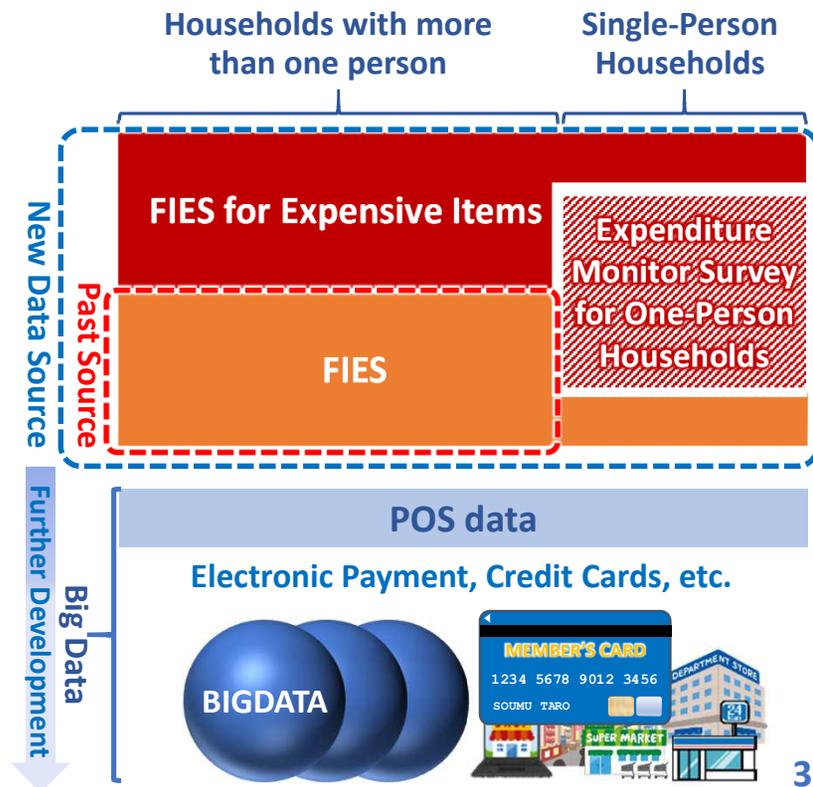### Expenditure Monitor Survey for One-Person Households

- The sample of former FIES consisted of **8,000 households with more than one person** and **800 single-person household**. Hence, statistics of single-person households could be released **quarterly**.

- To produce an overarching statistics for **every month**, **Expenditure Monitor Survey for One-Person Households** launched on August 2017.

Practical analysis

- Household Consumption Trend Index is made of: **FIES**, **FIES for Expensive Items**, **Expenditure Monitor Survey for One-Person Households**, etc.

Medium- to long- term

- Accuracy will be improved when Big Data is practically available.

Households with more than one person | Single-Person Households

New Data Source

Past Source

FIES for Expensive Items

FIES

Expenditure Monitor Survey for One-Person Households

Big Data Further Development

POS data

Electronic Payment, Credit Cards, etc.

BIGDATA

MEMBER'S CARD
1234 5678 9012 3456
SOUMU TARO

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Establishment of CTI Research Consortium (from 28 July 2017)

CTI Research Consortium

Private Companies (23 Data Holders)

Observer
As an advisor to the project

Statistics Bureau, Statistical Research and Training Institute, and **National Statistics Center**

MIC

Academics
* who must keep secrecy

Short Term（2017FY)	Medium Term（2018FY - 2020FY)	Long Term
The First Step Grasping characteristic of each Big Data	**The Second Step** Trial production of new index by Big Data	**The Third Step** Regular release of new index based on Big Data

- Grasping characteristics of data which is voluntarily provided from each company
- Developing the computation method, through the research for bias correction, imputation, etc.

- Developing new index through additional trials with past data

- Organizing a team for releasing index on a regular basis

"Data Holders" comprises: **loyalty card companies, credit card companies, gigantic retail companies, railway companies, makers of APP for electronic housekeeping book and data providers of point-of-sale.**

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Thank you