Evolution of Consumption Statistics Driven by Big Data
- An Example from Ministry of Internal Affairs and Communications, JAPAN -

June 2018, Beijing

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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.

\[
x_t = F x_{t-1} + G v_t \\
y_t = H x_t + u_t
\]

**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.
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.

- 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.
Establishment of CTI Research Consortium (from 28 July 2017)

CTI Research Consortium

Private Companies (23 Data Holders)

- Observer
  As an advisor to the project

- Academics
  * who must keep secrecy

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

Short Term (2017FY)
- The First Step
  Grasping characteristic of each 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.

Medium Term (2018FY - 2020FY)
- The Second Step
  Trial production of new index by Big Data
  - Developing new index through additional trials with past data

Long Term
- The Third Step
  Regular release of new index based on Big 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.
Thank you