



Cabinet Office, Government of Japan

Economic and Social Research Institute

Research on measuring price of health
care services reflecting the quality
change for the improvement of the GDP
deflator

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Back ground of the research

- As one of the efforts to improve the accuracy of the National Accounts, we started research on measuring prices that reflect changes in the quality of health and long-term care services, together with the education.
- The "Basic Policy for Statistical Reform(decided by the Council on Economic and Fiscal Policy in December 2016)" and "Basic Plan for the Development of Official Statistics(decided by the Cabinet in June 2020)," etc. require ESRI to do so.
- I led the unit studying the quality of health and long-term care.

Outline of the research

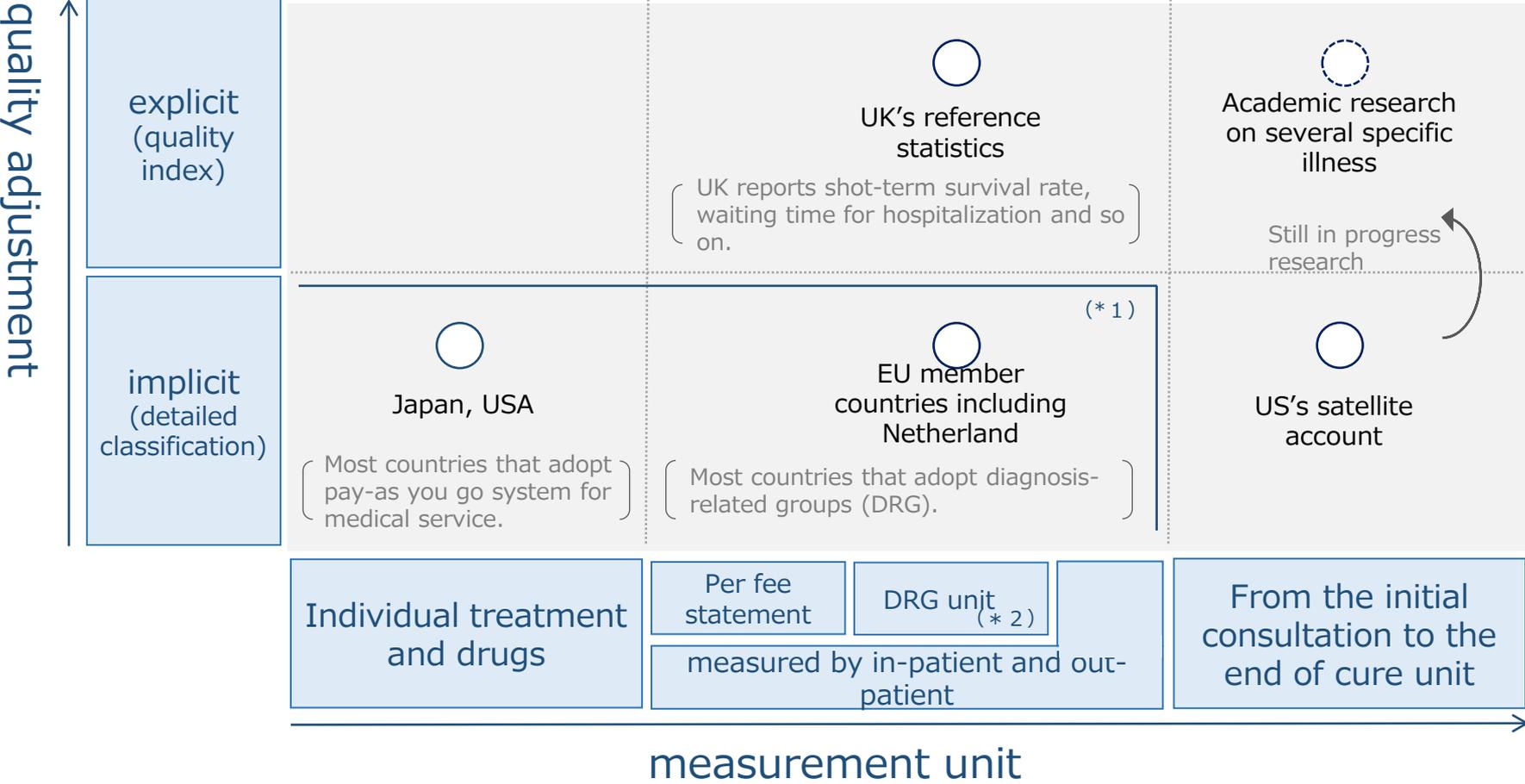
Define and estimate the output of health care services as "treatment of injuries and illnesses", using comprehensive micro data (NDB).

- We assume that the entire health care service, from the initial consultation to the cure required to treat a specific injury or disease of one patient, is one unit of the service. The total medical fee included in the service is recognized as the price.
- In the current GDP deflator, i.e. CPI, individual health care services such as consultation, hospitalization, and prescription drugs are considered as separate services. In our approach they will be regarded as inputs for the production of a single service, "treatment of an injury or disease.
- This becomes possible because we are allowed to use the National Database that contains all the health insurance claims since 2009.
- However, without sufficient classification of injuries and illness, quality can no longer be said to be constant. We face various difficulties in the current health care fee statements that are available for estimates.
- Moreover, if we consider that the sophistication of health care, although more expensive, but also improves the outcomes of treatment, then quality improvements would simply be estimated as price increases. This means that explicit quality adjustments need to be made after all.
- In addition, we find NDB do not offer enough information to estimate the quality of health care services.

National Database

- Since 2009 the Ministry of Health, Labor, and Welfare has operated the National Database of Health Insurance Claims and Specific Health Checkups of Japan (NDB).
- Each month, hospitals issue one health insurance claim for each patient to the insurer of the patient. It contains data on; major injury/illness, name of the patient, insurance ID, drug names and quantity, treatment contents, number of day stay in hospital, and information on death or recovered, and so on.
- But a health insurance claim is not a medical record. We cannot know the relation between the purchased treatments and injury/illness. In addition, patients often change hospitals in Japan.

International comparison



(* 1) out of blue line estimates are at rather experimental stage
 (* 2) in the DRG classification, acute hospitalization is counted as one unit of service from hospitalization until leaving the hospital. Mental health and other chronical hospitalizations are measured by the number of patients.

How health care services are treated in JSNA, I-O, and CPI in Japan

GDP classified by economic activities	Input-Output Tables Input Table (Basic Sector(509 Rows * 391 Columns))	Domestic Production(2015,million yen)	CPI item
Human health and social work activities	Medical service (hospitalization)	16,726,549	Medical services
	Medical service (except hospitalization)	16,108,902	Childbirth hospitalization fee
	Medical service (dentistry)	3,659,402	Medical treatment fee for massage
	Medical service (pharmacy dispensing)	7,960,106	Fees for complete medical checkup
	Medical service (miscellaneous medical service)	1,327,300	Fees for vaccination
	Health and hygiene (public institution) **	668,875	—
	Health and hygiene	1,298,112	—
	Social insurance **	1,648,546	—
	Social welfare (public institution) **	1,367,261	—
	Social welfare (NPI) *	3,230,291	—
	Social welfare	945,925	—
	Nursery	2,717,264	Nursery school fees After-school childcare fees
	Nursing care (facility services)	3,622,948	fee for nursing care
Nursing care (except facility services)	6,305,324		

Example: Changes in treatment of acute appendix①

When measured on an individual practice basis, the change in price is $\pm 0\%$.

	Laparotomy (abdominal surgery) (Hospitalized for 10 days in total)		Laparoscopic hand surgery (Hospitalized for 5 days in total)	
Items on the receipt	Price (10 point unit)	Quantity	Price	Quantity
Basic hospitalization fee				
10:1 basic hospitalization fee	1,332	<u>10</u>	1,332	<u>5</u>
Additional fee for within 14 days stay	450	<u>10</u>	450	<u>5</u>
Additional fee on basic hospitalization				
Additional charge for comprehensive hospitalization system	120	<u>10</u>	120	<u>5</u>
Additional fee for inpatient care at clinical training hospitals	20	1	20	1
Additional fee for medical record management system	30	1	30	1
Additional fee for medical safety measures	85	1	85	1
Additional fee for physician's office support system	255	1	255	1
Surgical operation				
Pendulum Excision	6,210	<u>1</u>	6,210	0
Laparoscopic pectus excision	11,470	0	11,470	<u>1</u>
Anesthesia				
Spinal anesthesia	850	1	850	1
Anesthesia management fee (Ⅱ)	150	1	150	1
Inpatient meal plan (Ⅰ)	640	<u>26</u>	640	<u>11</u>
Total		Yen 282,340		Yen 230,240

Changes in treatment of acute appendix②

When measured on an injury-illness basis, the change in price is -18.5%.

	laparotomy (abdominal surgery) (Hospitalized for 10 days in total)		Laparoscopic hand surgery (Hospitalized for 5 days in total)	
Injury and illness classification	Price	Quantity	Price	Quantity
Diseases of digestive system				
Diseases of oral cavity, salivary glands and jaws	----	----	----	----
Diseases of esophagus, stomach and duodenum	----	----	----	----
Diseases of appendix	282,340	1	230,240	1
Hernia	----	----	----	----
Noninfectious enterocolitis and colitis	----	----	----	----
Other diseases of intestines (etc.)	----	----	----	----
Diseases of skin and subcutaneous tissue				
Skin and subcutaneous tissue infections	----	----	----	----
Pemphigus	----	----	----	----
Dermatitis and eczema (etc.)	----	----	----	----
Total		Yen 282,340		Yen 230,240

Is it indeed appropriate to recognize changes in treatment methods as price changes?

In cases where treatment outcomes are generally constant, for example, day treatment for acute appendicitis, an approach that recognizes fewer medical resources as a reduction in price is considered appropriate.(case 2)

However, assuming that technological advances in medicine are usually "more effective and more expensive," it is not necessarily appropriate to compare different treatment methods solely on the basis of their costs.(case 3)

Change in deflator, nominal and real value of output by case

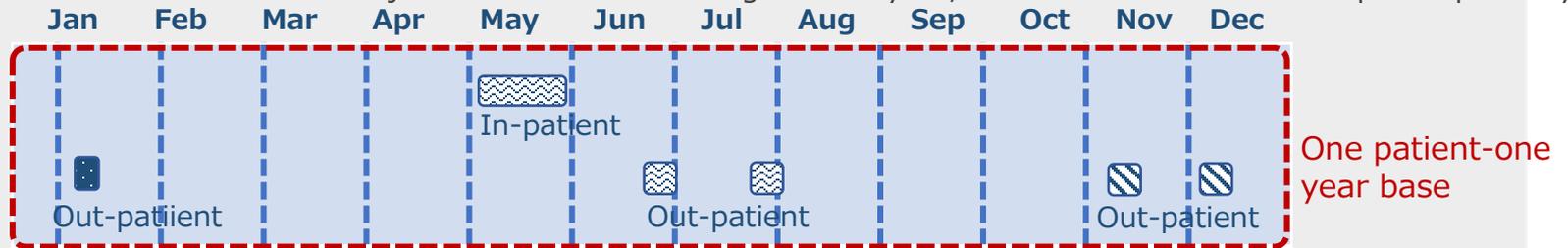
	Medical practice base	Injury-illness base
Case 1: Revisions to medical fee have increased the unit price of each practice.	deflator: increase (↑) <hr/> nominal value: increase (↑) real value: no change (→)	deflator: increase (↑) <hr/> nominal value: increase (↑) real value: no change (→)
Case 2: Fewer medical practices are now required to cure the disease than before.	deflator: no change (→) <hr/> nominal value: decrease (↓) real value: decrease (↓)	deflator: decrease (↓) <hr/> nominal value: decrease (↓) real value: no change (→)
Case 3: Shifted to more expensive (advanced) different practices	deflator: No change (→) <hr/> nominal value: increase (↑) real value: increase (↑)	deflator: increase (↑) <hr/> nominal value: increase (↑) real value: no change (→)

Calculation assumption

Costs covered (=price)

The comprehensive micro data set enables estimating the entire health cares fee in a year for each individual.

If a patient suffers from three different injuries and illnesses throughout the year, and is in and out of the hospital repeatedly



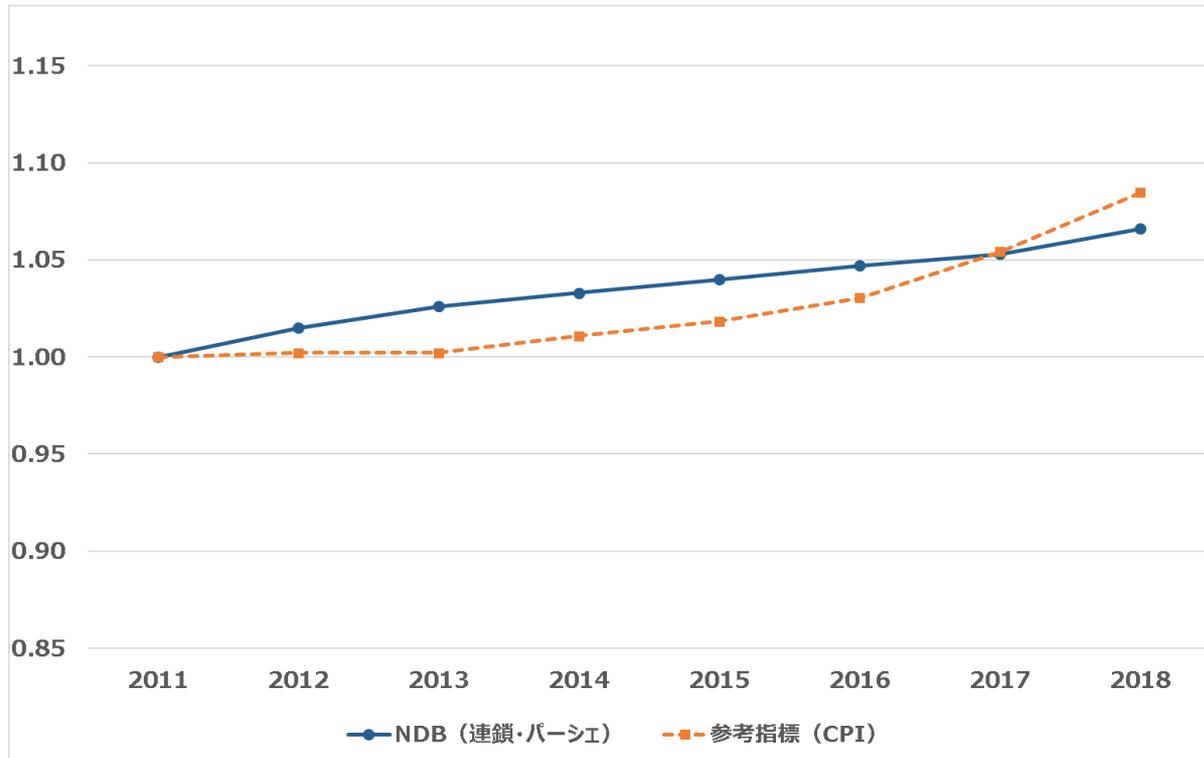
Identification of injury/illness and division of costs

All medical fee scores are assumed by the major injury/illness of the month in which the medical fee scores are highest in the year

Name of injury/illness	Medical fee scores			Total
 Influenza	500 (Jan out-patient)			500
 Pneumonia	<u>12,000</u> <u>(May·DPC)</u>	2,000 (Jun out-patient)	2,000 (Jul out-patient)	16,000
 Bronchitis	1,000 (Oct out-patient)	1,000 (Nov out-patient)		2,000
Major injury/illness of patient A: Pneumonia				18,500

Pneumonia is the major illness of May, in which scores are the highest in the year

Calculation result (in-patient, out-patient, DPC inpatient)



Moderate increase is observed for our calculated deflator, while medical fee in CPI rises quickly after 2014, reflecting higher out-of-pocket costs in public health insurance.

Main challenges

1. Limitation of available micro dataset(=health insurance claim)

(1) Identification of patients

- Two types of IDs are stored in the NDB to ensure patient traceability, but in several cases, they are untraceable due to insurance withdrawal (job loss, new graduates, retirement, transition to a later-stage health care system). We developed an algorithm, but still in need of improvement.

(2) Identification and weighting of patient's injury or disease

- Although the severity of the same injury or disease and the level of medical expense input differ when there are comorbidities, the injury and disease information in the health insurance claim is not sufficiently weighted by the patient's injury or disease, making it difficult to subdivide the information. In our estimate, we used very rough assumption.

(3) Characteristics of micro dataset (=health insurance claim)

- Length of available data of electric health insurance claim is too short to be able to estimate long enough time series data for SNA. It just started from 2009.

Main Challenges

2. Explicit quality adjustment is necessary after all

- Even if the price of "wound healing" has increased*, if the outcome (outcome) of the treatment has improved, then a quality adjustment should be made so as not to overestimate the price increase.

3. Detailed official prices are available

- The Guidance Note to SNA 2025 states that areas with market prices should be estimated using the normal deflation method. The OECD also states that in addition to price indexes such as CPI and PPI, deflation by pseudo-price indexes is included, and that "official prices set by governments may be used to calculate pseudo-price indexes if they appropriately reflect their respective costs and are sufficiently homogeneous."

4. MHLW estimates change in quality differently

- Ministry of Health, Labor and Welfare conducts their own business of estimating quality of health service, using indicators like patient's satisfaction, existence of cancer-board, number of incidents in hospitals and so on. OECD also organize such indicators. These indicators not only serve to improve hospitals performance but also will be reflected in health insurance claim points.

Summary

- We used micro dataset of health insurance claims from the National Database (NDB) (10 years of complete coverage in a special sampling format) to estimate deflators of medical care using the annual treatment cost of a specific patient as the unit of price.
- The deflator recorded an increase of about 6.6% from 2011 to 2018, but the increase does not separate the effects of comorbidities in the elderly and is likely to deviate from the actual situation.
- There are many other systemic problems with NDB that need to be cleared, such as the identification of patients, etc. We also need to estimate explicit quality changes. MHLW also have their own definition of quality of health service. We will closely monitor the MHLW's efforts to address these issues.