日本銀行
BANK OF JAPAN

Japan's Corporate Services Price Indexes for Commercial and Industrial Machinery Repair and Maintenance

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Introduction

- The Bank of Japan (BOJ) currently publishes the following price indexes for “Commercial and Industrial Machinery Repair and Maintenance” services in Japan’s Corporate Services price Index (CSPI).
  - Machinery repair and maintenance (except Electric & electronic products)
  - Electric & electronic product repair and maintenance

- Since we are in the process of rebasing our CSPI from the 2005 base to the 2010 base, any comments or suggestions would be greatly appreciated.

Service definition & Pricing unit of measure

- Establishments in this industry engage in repairing and maintaining machinery, such as general machinery, construction & mining machinery, and electrical machinery, apparatus, & appliances.

- There are typically two types of pricing mechanisms.
  - Flat fee for service
    → For general, periodic services
  - Fee based on the amount of labor and parts
    → For fully-customized, one-off services

Pricing unit of measure (cont'd)

- The BOJ currently surveys repair and maintenance services of the following nine types of machinery.

		
Plants	Construction & mining machinery	Special industrial machinery
		
Metal working machinery	Copying machinery	Electricity distribution apparatus
		
Computer-related machinery	Communication equipment	Medical equipment

Pricing unit of measure (cont'd)

- The following price determining characteristics are specified in price surveys:
  - Types of machinery
  - Types of clients
  - Types of services
  - Number of units
  - Periodic / on-demand services
- For example, maintenance services for elevators
  - Type of machinery: Elevators with monitoring systems
  - Client: A
  - Type of services: Full-maintenance services
  - Number of units: 6 units
  - Periodic / on-demand: Periodic

Market conditions

- Size of industry

Japan's CSPI covers business-to-business transactions.

The estimated business-to-business transaction value for this service in 2005 Input-Output Tables is 6.1 trillion yen (equivalent to 76 billion U.S. dollars, 63 billion Euros).

→ The service accounts for 2% of the total value of business-to-business services transactions in Japan.

- Special conditions

Various types of establishments provide the service:

- Specialized machinery repair establishments
- Manufactures
- Distributors (wholesalers and retailers)

→ Price surveys are required to understand the market as a whole, covering various types of establishments.

Classification issues

- The BOJ uses the Japan Standard Industry Classification (JSIC), which generally follows the ISIC. The table below provides the JSIC classification structure.

Division	Group	Class	
R			**Services, N.E.C**
	901		**Machine repair shops, except electrical machinery, apparatus, appliances and supplies**
		9011	General machine repair shops, except construction and mining machinery
		9012	Construction and mining machinery repair shops
	902		**Electrical machinery, apparatus, appliances and supplies repair shop**
		9021	Electrical machinery, apparatus, appliances and supplies repair shop

- The disaggregated price indexes “Machinery repair and maintenance (except Electric & electronic products)” and “Electric & electronic product repair and maintenance” follow the JSIC categories above.

Classification issues (cont'd)

- Evaluate how the classification system fits well with the market conditions: comparing ISIC (not JSIC) with the market conditions seems to be more helpful, since ISIC is universal. The table below provides ISIC Rev.4 structure.

Section	Division	Group	Class	
C				**Manufacturing**
	33			**Repair and installation of machinery and equipment**
		331		Repair of fabricated metal products, machinery and equipment
			3312	Repair of machinery
			3313	Repair of electronic and optical equipment
			3314	Repair of electrical equipment
			3315	Repair of transport equipment, except motor vehicles
			3319	Repair of other equipment
S				**Other service activities**
	95			**Repair of computers and personal and household goods**
		951		Repair of computers and communication equipment
			9511	Repair of computers and peripheral equipment
			9512	Repair of communication equipment
G				**Wholesale and retail trade**
No categories for machinery repair and maintenance in section G.				

Machinery repair and maintenance services provided by *manufactures*

The services provided by *specialized repair and maintenance establishments*

- Given the nature of the market conditions, it would be more appropriate for ISIC to have categories in section "G-Wholesale and retail trade" as well. Currently, however, there are no categories in section G.

Pricing methods

- The BOJ currently uses the Direct use of prices of repeated services method, Model pricing method, and Time-based pricing method.
- The selection of the pricing method will depend on the type of pricing mechanisms used for a particular service, i.e., whether flat fees or pricing based on the amount of labor and parts are used.
- When repair and maintenance companies charge flat fees, data on the flat fee for the specified repair and maintenance service should be collected. In this case, the *Direct use of prices of repeated services* method is used.
- On the other hand, when repair and maintenance companies base their charges on the amount of labor and the parts used, the *Model pricing method* and *Time-based pricing (charge-out rates)* are employed.

Direct use of prices of repeated services

- When this method is used, the respondent specifies a representative transaction at the start of the survey.

Example: Repair and maintenance service for elevators

Type of machinery:	Elevators with monitoring systems
Client:	A company
Type of services:	Full-maintenance services
Number of units:	6 units
Periodic or on-demand:	Periodic

→ Monthly charges are collected from the respondent.

Model pricing method

- When this method is employed, the respondent specifies a representative contract/model and estimates prices for the “model” services.

Example: Repair and maintenance service for power shovels

Type of machinery:	Power shovel, product code “ABC-1”
Client:	B company
Type of services:	Oil filters maintenance
Number of units:	1 power shovel
Parts required:	2 oil filters, product code “F-123”
Man-hours required:	2 hours for travel, 0.5 hours for maintenance
Technician’s level:	Level-2
Periodic or on-demand:	On-demand

Model pricing method (cont'd)

- Prices are estimated as follows:

$P_{t=n} = TPC_{t=n} + TRC_{t=n} + CM_{t=n}$

$TPC_{t=n}$: Total Parts Cost $_{t=n}$ = Parts cost $_{t=n}$ X Number of parts required $_{t=0}$

$TRC_{t=n}$: Travel Cost $_{t=n}$ = Charge-out rate $_{t=n}$ X Travel time required $_{t=0}$

$CM_{t=n}$: Charges for Maintenance $_{t=n}$ = Charge-out rate $_{t=n}$ X Maintenance time required $_{t=0}$

➢ Let us estimate prices using the following situation.

	The cost of oil filter	The charge-out rate for a level-2 technician
time 0	$20 per oil filter	$12 per hour
time 1	$18 per oil filter	$16 per hour

$P_{t=0}$ = $20 X 2 oil filters + $12 / hour X 2 hours +$12 / hour X 0.5 hours = $70.

$P_{t=1}$ = $18 X 2 oil filters + $16 / hour X 2 hours + $16 / hour X 0.5 hours = $76.

Time-based pricing

- When this method is employed, the prices of services per unit of labor input are surveyed in the case where the quality of the product is proportional to the quantity of labor input. At the start of the survey, the respondent specifies a representative service and technicians'/engineers' level in skill.

Example: Repair and maintenance service for plants

Type of plants:	Chemical
Client:	C company
Type of services:	Welding maintenance
Technician's level:	Level-3
Periodic or on-demand:	Periodic

Time-based pricing (cont'd)

- Prices are estimated as follows:

  $P_{t=n}$=*Total revenue* $_{t=n}$ ÷ *Unit of labor input (Man-hours required)* $_{t=n}$

  - Let us estimate prices using the following situation.

	Total revenue	Unit of labor input (Man-hours required)
time 0	$ 150	Two level-3 technicians, working 3 hours each
time 1	$ 300	Three level-3 technicians, working 5 hours each

$P_{t=0}$= *$150 ÷ (Two level-3 technicians X 3 hours) = $25.*

$P_{t=1}$= *$300 ÷ (Three level-3 technicians X 5 hours) = $20.*

Quality issues

- In order to keep the unit of measure constant over time, the BOJ asks respondents to specify the technology-related characteristics such as,
  - Technicians'/engineers' levels in skill
  - Man-hours required
  - Parts needed for providing repair and maintenance services

Comparison of the concepts and definitions

- The concepts and definitions underlying the CSPI fit well with those underlying the 2008 SNA and the turnover measures.

The 2008 SNA

The output of this service would include all costs (the cost of parts used for the service is also included)

Turnover measures

The Input-Output Table are compiled on activity-basis, which covers the turnover derived not only from specialized establishments, but also from manufactures and distributors

Japan's CSPI

Prices include all costs, such as parts costs and travel costs.

Price surveys cover various types of service providers.

Concluding remarks

- The BOJ currently publishes two price indexes for this service: “Machinery repair and maintenance (except Electric & electronic products)” and “Electric & electronic product repair and maintenance.”
- Various types of establishments provide the services. Price surveys covering all providers are required to grasp the market as a whole.
- The selection of the pricing method will depend on the type of pricing mechanisms. When companies charge flat fees, the *Direct use of prices of repeated services* method is used for price estimates. Whilst they base their charges on the amount of labor and the parts used, the *Model pricing method* and *Time-based pricing* are employed.
- Since we are now in the process of rebasing our CSPI from the 2005 base to the 2010 base, any comments or suggestions would be greatly appreciated.