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Producer Price Index (PPI)

for Sea Freight Transport Services

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Introduction

1. Producer Price Index (PPI) is a measure of the average changes in prices received by producers of goods and services. It is currently compiled by the Census and Statistics Department (C&SD) for Hong Kong (HK)'s manufacturing industries and some selected service industries.

2. For service industries, PPIs have been developed by phase since mid 1998. Only selected service industries are covered in view of the more sophisticated conceptual and technical complexities involved in service industries than that in manufacturing industries. At present, 11 PPI series are published viz.

- *hotels and boarding houses*
- *telecommunications*
- *miscellaneous communication services*
- *air transport*
- *land transport*
- *maritime transport*
- *storage*
- *rental of machinery and equipment*
- *real estate maintenance management, brokerage and agency services*
- *stock, commodity and bullion brokerage services*
- *legal, accounting, auditing and bookkeeping services*

3. According to the Hong Kong Standard Industrial Classification (HSIC) Version 1.1[1], sea freight transport services are mainly provided by establishments classified under the following industry groups within the maritime transport sector:

(i) *ship agents and managers* (HSIC 7141);

(ii) *ship owners of sea-going vessels* (HSIC 7142);

(iii) *operators of sea-going vessels* (HSIC 7143);

(iv) *inland water freight transport* (HSIC 7154);

(v) *container terminals, haulage of containers and container leasing* (HSIC 7161);

(vi) *supporting services to water transport, n.e.c.* (HSIC 7169);

(vii) *sea cargo forwarding services* (HSIC 7183); and

(viii) *ship brokers* (HSIC 7184).

[1] In the Census and Statistics Department, Hong Kong, China, the industries are classified according to the "Hong Kong Standard Industrial Classification (HSIC) Version 1.1" which is adapted from the United Nations' International Standard Industrial Classification Rev. 2.

In addition, there is an increasing trend for sea freight transport operators/agencies to provide multi-modal services by bundling sea freight transport with land and/or air freight transport, or even customised logistics services as a total solution.

4. At present, PPI is only published for the maritime transport sector as a whole, which comprises the following industry groups:

(i) *ship owners of sea-going vessels* (HSIC 7142);

(ii) *operators of sea-going vessels* (HSIC 7143);

(iii) *container terminals, haulage of containers and container leasing* (HSIC 7161);

(iv) *sea cargo forwarding services* (HSIC 7183)*;*

(v) *ship owners and operators of Hong Kong-Macao vessels* (HSIC 7144)*; and*

(vi) *harbour ferries* (HSIC 7151).

The PPI for maritime transport sector therefore covers both sea passenger transport (viz. the last 2 items above) and part of sea freight transport services mentioned in para. 3 above. Price data regarding these sea freight transport services, which are a subset of the services provided by the maritime transport sector, are collected but a PPI for sea freight transport services alone is not separately published.

5. Presented below are the basic concepts and methodology involved in compiling the PPI for sea freight transport services. Problems encountered during the development stage and ways to tackle them are also discussed.

Industry Profile

6. Strategically located at the heart of Asia and the entrance to the Peal River Delta, HK maintains an efficient and extensive international transport and logistics network to move passengers and cargoes. HK is well known as a major international maritime centre and has maintained its position as the world's busiest container port in 2002 with a fine harbour that can receive vessels of all sizes from around the globe. In 2002, HK was the world's tenth largest trading economy in the world.

7. In 2002, the port registered a total of 440 000 inward and outward vessel movements. This represented a 2% increase compared with 2001. On average, some 1 200 vessels entered or left the port each day.

8. A total of 190 million tonnes of cargo moved in and out of HK by sea (including ocean and river) in 2002, which was around 4.8 times that moved by land

(including road and rail). In addition, 19 million T.E.U. (i.e. Twenty-foot Equivalent Unit, a standardised container size of 20 feet x 8 feet x 8 feet) of containers were handled by the port in 2002, a record high in the past decade.

9. In 2001, there were 6 200 establishments and 49 400 persons engaged in all the industries closely related to sea freight transport services, i.e. those listed in para. 3. Amongst the 6 200 establishments, the overwhelming majority (i.e. 85%) were small establishments[2] while medium and large ones accounted for 13% and 2% respectively.

10. A total of HK$87.9 billion in terms of business receipts and other income was generated by these establishments in 2001. Analyzed by size of establishment, 56% of the total receipts was attributed to small establishments, 25% to medium establishments and 19% to large establishments. On the other hand, freight revenue from sea freight transport services accounted for 90% of the total receipts.

11. In recent years, many transport operators opt to diversify their services by providing logistics services as a total solution to customers. The distinction between air, road and sea freight transport services therefore becomes less obvious. The operators now claim themselves as all-round freight-related services providers, which can offer some or all of the following in addition to freight transport services:

- order processing
- warehousing
- assembling and packaging
- distribution
- customs clearance
- inventory control
- repair and return services
- logistics consultancy services

Consultation on Feasibility of Data Collection

12. As part of the planning process, consultation visits with prominent business firms in the maritime transport sector were undertaken to ascertain the feasibility of collecting the required price and business receipts data. By so doing, practical difficulties which firms might encounter in supplying the required data and areas for improvement were identified.

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[2] Small establishments refer to those engaging less than 10 persons. Medium establishments refer to those engaging 10-49 persons. Large establishments refer to those engaging 50 persons or more.

Data Collection Methodology

13. Producer prices are actual transacted prices received by local producers for their output, net of any discounts, premiums, rebates or allowances given to buyers, but including surcharges.

14. In PPI compilation, data are mainly collected through the Quarterly Survey of Service Industries (QSSI) which covers all establishments engaging 5 or more persons in the service industries. The QSSI also collects business receipts data for compiling the quarterly business receipts indices of service industries to measure changes in the value of local services output. The business receipts data provide the weights for PPI compilation. For some service products where price data are currently collected through the Consumer Price Index (CPI) system, relevant price data are extracted from the CPI system instead of collected through the QSSI[3].

15. The sampling frame for the QSSI is compiled from a comprehensive register of business establishments maintained by the C&SD. The register is regularly updated with reference to records of the Business Registration Office of the Inland Revenue Department.

16. A rotational replicate sample design is adopted in the QSSI. Every year, about one-third of the sample will be updated to include newly selected establishments while one third of the sample will be rotated out. Establishments are sampled after stratification by industry group and employment size. The sample size for each industry group and employment size stratum is determined by Neyman's allocation according to a desired level of precision.

17. For each survey round, questionnaires are mailed to sampled establishments. Electronic questionnaire is also made available upon requested. Data are collected by post/fax/email, supplemented by face-to-face/telephone enumeration/verification where necessary.

18. Respondents are asked to supply the quarterly averages of actual transaction prices for service products which they consider to be typical and representative of their business. More importantly, the price data should be based on stable and continuing transactions. In addition, the prices should be quoted from actual services where the required data are readily available and can be quickly retrieved from account ledgers

[3] In the case of sea freight transport services, they are not covered by the CPI system. For other industries under maritime transport, namely those related to passenger transport services, price data are collected via the CPI system.

and record systems of the respondents. The main price-determining parameters include:

- origin and destination
- single or round trip
- size of container (i.e. charge per twenty-feet or forty-feet equivalent unit)
- type of cargo (general, dangerous or refrigerated)
- weight or volume for non-containerized cargo (i.e. charge per tonne / kg / m^3 / box)
- type of transport equipment (i.e. charge per truck / vessel)
- need for other services (e.g. loading / unloading, stuffing / stripping, container haulage & leasing, storage, documentation, etc.)
- frequency (i.e. charge per hour / week / month)

19. The total amount of business receipts of various sea freight and related transport services rendered as well as other income received during the reference quarter are collected from establishments concerned. In addition, two more types of price data are collected, viz.

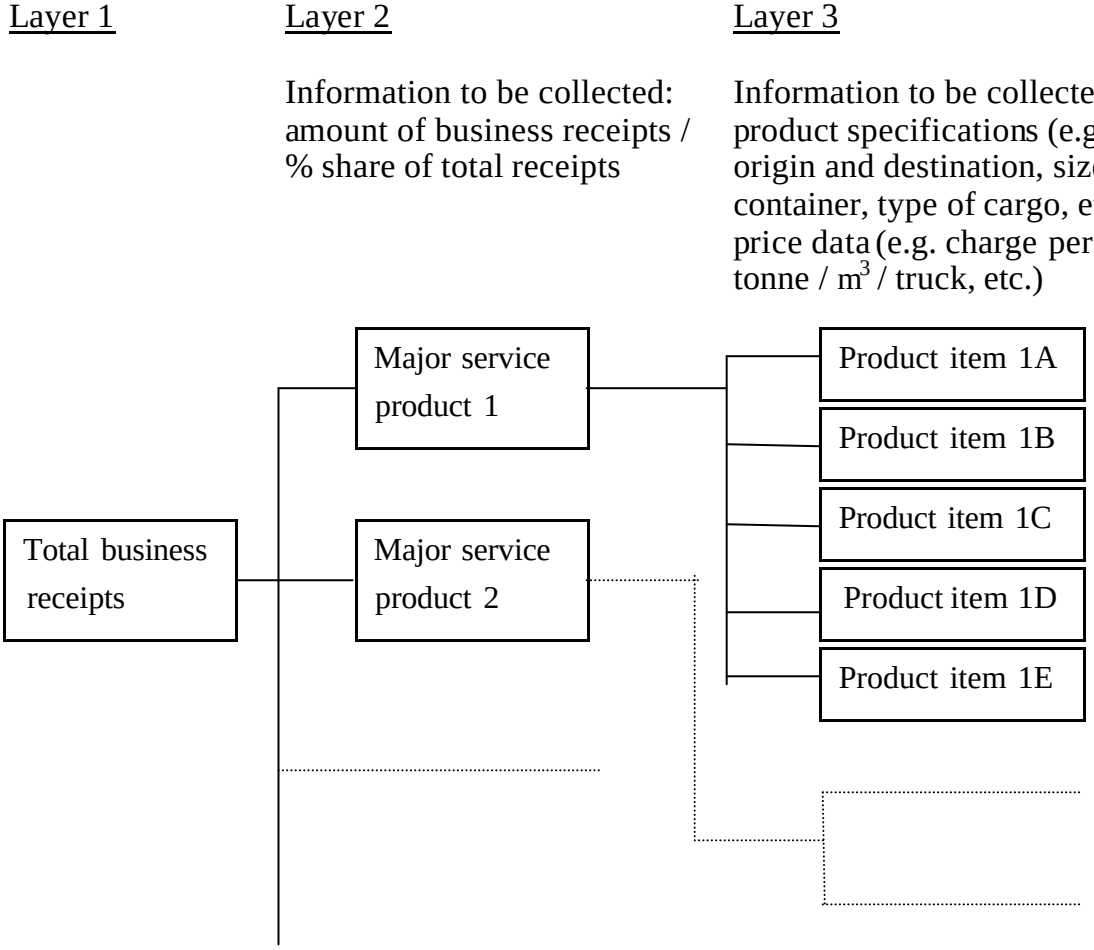
(a) receipts (or % of total business receipts) in respect of individual major **service products**; and

(b) the corresponding product specifications as described in para. 18 above and price data on prominent **product items** of individual major service products.

20. The amount of business receipts provides information on the relative importance and serves as weights for different service products, while price data on prominent product items are the basic elements in compiling the PPI. To reduce respondent burden, product specifications and price data are collected only on those service products which account for >15% of the total business receipts of the establishments concerned.

21. To further contain respondent burden and data processing workload, the maximum number of product items to be reported under each major service product is limited to 5, i.e. the five most prominent product items in terms of business receipts.

22. The aforesaid system belongs to a hierarchical data reporting system which consists of 3 layers as shown below:



Compilation Method

23. The PPI is aggregated from the lowest (establishment) to the highest (broad service industry group) level and is calculated using the price data of the reference quarter in current year in comparison with that of the previous year. The levels, ranked from the lowest to the highest, are:

(i) establishment
(ii) service product
(iii) service industry
(iv) broad service industry group

The PPI at levels (ii) to (iv) are calculated as the weighted averages of PPIs at the next lower level, using business receipts as weights.

24. The computation and aggregation of PPI using chained Laspeyres Index method at various levels are presented below:

(a) identify the more important service products and corresponding product items of the industry;

(b) at the establishment level, compute the *price relative* (i.e. the ratio of producer price for the reference quarter to the average producer price of the same product in the preceding year) of each selected service product;

$$P_{ij} = \frac{1}{n_{ij}} \sum_{h=1}^{n_{ij}} \left(\frac{P_{ijh}}{P''_{ijh}} \times 100 \right)$$

where P_{ij} = *price relative* of product (i) in establishment (j)

= simple arithmetic mean of *price relatives* of the n_{ijh} item

P_{ijh} = *price relative* for item (h) of establishment (j) for product (i)

P''_{ijh} = quarterly average of producer prices for item (h) of establishment (j) for product (i) in the preceding year

n_{ij} = no. of items reported by establishment (j) for product (i)

(c) at the service product level, compute the *price relative* by aggregating the *price relative* of that service product offered by individual establishments in the industry, using the business receipts of the service product received by the establishments concerned in the preceding year;

$$P_i = \frac{\sum_i (P_{ij} \times B_{ij})}{\sum_j B_{ij}}$$

where P_i = *price relative* of product (i)

P_{ij} = *price relative* of product (i) in establishment (j)

B_{ij} = business receipts of establishment (j) for product (i)

(d) at the service industry level, compute PPI of the respective industry by aggregating the *price relative* of the service products, using the business receipts of the products obtained from the latest round of the relevant annual economic surveys as weights;

(e) if applicable, repeat the above procedures at the broad service industry level by aggregating the PPI of the service industries, using the business receipts of the industries obtained from the latest round of the relevant annual economic surveys as weights; and

(f) the result, being an index with the preceding year as the comparison base, is converted to the PPI of the industry with 2001 as base by the method of chaining. The chained index is considered most appropriate for compiling PPI given the rapid changes of service products over time.

Limitations and Difficulties in Data Collection

Selection of Service Products and Items

25. As mentioned earlier in para. 21, a respondent is required to report data on all major sea freight transport service products delivered in the reference quarter, each further expanded into 5 items with detailed pricing data. While the business receipts can be easily classified into prominent service products according to the pricing parameters outlined in para. 18, some respondents found it difficult to pick up 5 items for each service product out of the many transactions that have taken place.

26. After detailed discussion with field officers and respondents, it is found out that the set of transactions follow similar patterns within the same industry and the pricing mechanism is more or less homogeneous. In this connection, it is decided to pick 5 trips that are most prominent in terms of business receipts and the most comprehensive in terms of services delivered.

27. It is observed that more and more freight transport operators are diversifying their activities to providing all-round freight-related logistics services. It is thus more difficult to provide service charges for air, road or sea freight transport services separately. In view of the complexity in collecting stable and representative pricing parameters, sometimes the price of the whole service bundle is recorded.

28. In other cases, it is not uncommon for freight operators who provided sea freight transport services to also provide other value-added freight-related services such as freight transport agency services for various modes, cargo handling services, storage services and rental of vessels. As a result, relevant price data for the whole service bundle are also recorded if charges of separate components cannot be easily identified.

Reported Price Relative

29. In the course of collecting price data, some respondents show great reluctance in reporting price data of their services owing to keen market competition and fear to disclose sensitive commercial information. To facilitate data reporting, respondents are allowed to report price relative, defined as the % change of average price (P) of a product item at current quarter (q) against previous quarter (q-1), instead of the exact price data, of each item. Some illustration examples are given in the table below:

Type of service	% share	Specification of Major Product Item	Unit	Exact prices (no need to be disclosed)			**Price relatives reported in the questionnaires**	
				02 Q4 [a]	03 Q1 [b]	03 Q2 [c]	**03 Q1** $\frac{[b]}{[a]} \times 100$	**03 Q2** $\frac{[c]}{[b]} \times 100$
Cargo handling service	60%	Container loading / unloading (20ft.)	Per container	$12.80	$13.00	$14.60	**101.56**	**112.31**
		Container stuffing / stripping (20ft.)	Per container	$112	$110	$107	**98.21**	**97.27**
		⋮	⋮					
Storage service	20%	General container storage (20ft.)	Per day	$300	$315	$300	**105.00**	**95.24**
		General container storage (40ft.)	Per day	$500	$485	$490	**97.00**	**101.03**
		⋮	⋮					
Port operation service	20%	Vessel berthing (100,000 tonnage)	Per hour	$1,200	$1,200	$1,300	**100.00**	**108.33**
		⋮	⋮					

30. The reported price relative is compiled as follows:

$$P^{q}_{q-1,ijh} = \frac{P^{q}_{ijh}}{P^{q-1}_{ijh}} \times 100$$

In other words, each reported price relative is a comparison of price in the current quarter against the previous quarter. Adjustment of the reported price relative to an initial reference quarter is required to standardise the comparison.

Replacement of Reported Service Products and Items

31. A rotational replicate sample design is adopted in the QSSI and an establishment is usually required to report price information for 12 consecutive quarters. During this period, it is not uncommon for a product item or a service product to change its composition or even to fade out from the market. For instance, a sampled sea freight transport operator cannot renew a contract with one of its prominent customers and therefore loses business of running several routes which have been quoted in earlier price reporting. In this case, the respondent has to report substitute items for replacement. The method of "price link" is applied.

32. In the price-link approach, apart from reporting the price of the substitute item in the current quarter, the sampled establishment also has to report its price in the last quarter for splicing. A proxy of the quarterly average producer price for the new item in the preceding year is

$$\hat{P}_{new} = \frac{P_{new}^{q-1} \times P_{old}}{P_{old}^{q-1}}$$

where $\hat{P}_{new}$ = proxy of the quarterly average producer price for the new item in the preceding year

33. For an establishment that no longer exists, there will be no price data of item for the current quarter, and the PPI should exclude it. Likewise is a newly opened establishment in the quarterly supplementary sample for which the price of the product item in the comparison year cannot be ascertained.

34. For an establishment that reports price data of a new item which is not a substitute of an existing item, the price data of that new item has to be stored for two or more quarters of the comparison year to enable the compilation of relevant price relative.

Quality Changes

35. In general, the PPI should not be affected by changes in quality or in sales condition. Quality changes have to be identified and eliminated in calculating price changes. Product changes that are regarded purely as pattern changes are not generally considered to be quality changes. Minor changes in specification that do not affect the contents of the service are also regarded as quality changes.

36. To separate pure price movements from other changes when an item is replaced by a substitute item of different quality, the method of splicing is used. Prices for both the old and the new item are collected in an overlapping quarter. The difference between the price movements of the two items in the overlapping quarter is assumed to represent the value of their quality differences. For the purpose of calculating the PPI, price relative for the new item in the quarter following the overlapping quarter will be linked with the price index of the old item in the overlapping quarter.

37. However, sometimes a new item does not exist when the old one is still in the market. In this case, it is necessary to probe for the 'best' average prices as if that new item is available for sale in the previous quarter so as to derive the overlapping linkage.

38. Respondents are asked to supply quarterly averages of actual transaction price data for the items quoted under each service product. Yet these average prices are subject to high volatility and price swings, partly due to changes in product mix or seasonal factors. To eliminate any change due to quality, the prices quoted should be based on a stable product mix. Where necessary, prices of a new mix are also collected to derive the overlapping linkage.

Release and Revision

39. The following 11 PPI series with base year 2001 = 100 are currently published in the *Hong Kong Monthly Digest of Statistics* and released in the *Frequently Asked Statistics* section of the C&SD Website (http://www.info.gov.hk/censtatd/eng/hkstat/fas/commerce/business/ppi_s_index.html):

- hotels and boarding houses
- telecommunications
- miscellaneous communication services
- air transport
- land transport
- maritime transport
- storage
- rental of machinery and equipment
- real estate maintenance management, brokerage and agency services
- stock, commodity and bullion brokerage services
- legal, accounting, auditing and bookkeeping services

40. To cater for late returns and data correction by respondents, PPI of the last one quarter *q-1* is revised and released when provisional PPI of quarter *q* becomes available. Quarter *q-1* figures are said to be final after revision in quarter *q*.