

Information Paper Series Rebasing of Computer Consultancy and

Information Services Price Index (Base Year 2021)



information paper

on

prices statistics

REBASING OF

COMPUTER CONSULTANCY AND INFORMATION SERVICES PRICE INDEX (CISPI)

(Base Year 2021)

Singapore Department of Statistics June 2022

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REBASING OF COMPUTER CONSULTANCY AND INFORMATION SERVICES PRICE INDEX (CISPI)



The CISPI measures the changes in the prices of services provided by Singapore-registered information technology service providers.

Weights Distribution

As Singapore strives towards a digital economy, e-commerce and in particular online marketplaces have grown in importance. To reflect this, online marketplace services have been included in the index scope for base year 2021, contributing to a larger weight share for the Information Services and Online Marketplace Price Index.



Sample of Companies and Products

The sampling frame was refreshed to ensure that the service products in the index are representative of the current activities and market share of the industry. To minimise respondent burden, the 2021-based CISPI survey frame was 23 per cent smaller than the 2016-based CISPI, with approximately 100 companies rotated out of the index and replaced with 70 new companies. The number of service products covered was 35 per cent lesser than the 2016-based index.



The general price movement of the CISPI for both base years trends upwards, influenced largely by the Computer Programming & Consultancy Price sub-index, which has higher weights than the Information Services & Online Marketplace sub-index. Slight differences in magnitude are due mainly to differences in the composition of companies and service products.





REBASING OF COMPUTER CONSULTANCY AND INFORMATION SERVICES PRICE INDEX (CISPI) (Base Year 2021)

I INTRODUCTION

The Department of Statistics (DOS) has rebased the Computer Consultancy and Information Services Price Index (CISPI) from the base year of 2016 to 2021. The rebasing exercise is conducted every five years to ensure that the weighting structure and the coverage of service products of the index are representative of the current activities and market share of the industry.

2 The CISPI is a services producer price index that measures changes in the prices of services provided by Singapore-registered information technology service providers. The index is used to monitor price trends for computer consultancy and information services and as inputs to estimate the real growth of this industry.

3 This information paper provides details on the 2021-based CISPI, and includes key changes from the rebasing, such as the weight comparison and price movement between the new 2021-based and the 2016-based price series.

II DESCRIPTION OF 2021-BASED CISPI

Index Coverage and Structure

4 The CISPI covers local companies classified under the following Singapore Standard Industrial Classification (SSIC) 2020¹ codes:

62 – Computer Programming, Information Technology Consultancy and Related Activities

- 6201 Computer Programming Activities
- 6202 Information Technology Consultancy and Computer Facilities Management Activities
- 6209 Other Information Technology and Computer Service Activities

63 - Information Service Activities and Online Marketplaces

- 6311 Data Analytics Processing, Hosting and Related Activities
- 6320 Online Marketplaces

5 The key services covered in the CISPI are application development and integration services, maintenance and support services, data centres, hosting services by non-data centres and online marketplace services. Internet search engines, software publishing and licensing, repair of computers and peripheral equipment and news agency activities are excluded.

6 The index structure of CISPI is presented in Figure 1. The CISPI comprises the Computer Programming & Consultancy Price Index (CPCPI) and the Information Services & Online Marketplace Price Index (ISOPI)². The CPCPI is split at the service level into two subindices, namely the Application Development & Integration Price Index and the Maintenance & Support Price Index. The ISOPI is split at the service level into three sub-indices, namely the Data Centre Price Index, the Hosting & Analytics Price Index and the Online Marketplace Price Index. The price indices at the service level are the lowest level indices, beyond these are the prices of individual service products.

 $^{^1}$ The SSIC 2020 publication is available at: $\underline{https://www.singstat.gov.sg/standards/standards-and-classifications/ssic}$

² Previously known as the Data Analytics Processing, Hosting & Related Activities Price Index from the CISPI (Base Year 2016). The name of the price index was changed to reflect the inclusion of online marketplace services in the coverage, aligning to the SSIC 2020.



Figure 1: Index Structure of CISPI

Index Computation

A price index is compiled from the weights and prices of the products selected in the index basket. The CISPI uses the weighted arithmetic mean (AM) Modified Laspeyres formula where the weight reference period of 2019 preceded the price reference period of 2021. At the most detailed level, a price relative is derived for each service product by taking the ratio of the current quarter's price to its corresponding base period price. The price relatives of the service products together with their respective weights are aggregated to form the Service level price indices. The weighted average of these sub-indices forms the Main level price indices, and subsequently the overall CISPI. More details on the index computation are available in Appendix I.

Weights

8 The weight of a service product reflects its relative importance within the basket and determines the impact that a particular price change will have on the overall index. The weights for the CISPI at the main index level and service index level are derived from the 2019 operating revenue of the information technology companies from DOS's surveys³ and supplemented with administrative data. Within each service level price index, the breakdown of weights by service product is determined by the operating revenue contribution of its company within the sample. Where more than one service product is provided by a company, the weight assigned to each service product is evenly distributed.

Pricing Method

9 Figure 2 lists the pricing methods used for the different service products. The service indices in CPCPI use the time-based pricing method as their activities usually involve charging the clients according to the time spent in the service provision. Charge-out rates for the main designations (e.g., project managers, developers, testers) involved in the services provided are priced. Online marketplace services adopt percentage fee (e.g., commission rates) and contract pricing methods depending on the companies' pricing policies. For data centres and hosting services, direct use of prices of repeated services and contract pricing methods are used as these services are provided more regularly.



Figure 2: Pricing Methods

³ Source: Department of Statistics' Annual Survey of Services 2019 and Survey of Information Technology Services Industry 2019

Data Collection

10 Prices are collected through routine price surveys and online web extraction. Where possible, internet prices are used when it is assessed to be suitable and representative of real transacted prices upon consulting the companies. Routine price surveys are conducted for half of the sampled companies in the first and third quarters of the year to collect monthly prices for six months, with the other half of the sampled companies surveyed in the second and fourth quarters of the year to similarly collect monthly prices for six months.

11 The CISPI covers 240 service products from 105 companies. Figure 3 provides the number of companies and service products collected within each Service index. The prices captured should reflect the amount received by a producer, excluding any taxes. When service products have discontinued, companies are requested to replace them with similar service products.



Figure 3: 2021-based CISPI Company and Service Product Count

III KEY CHANGES IN THE 2021-BASED CISPI

Inclusion of Online Marketplace Services

12 Online marketplaces are intermediary platforms that facilitate orders for goods or services between buyers and sellers usually on a fee or commission basis, without taking ownership of the goods or providing the services that are being sold through their online platforms (e.g., websites and mobile applications). With a new 3-digit code on 'Online Marketplaces' created in the SSIC 2020 and considering the growing prevalence of online marketplaces in Singapore, these services were included in the scope of the 2021-based CISPI. Industry research were conducted to understand the business models of online marketplaces to determine the appropriate pricing methods that best capture price movements. After engaging the companies initially to identify the service products, follow-up discussions were held with the companies where necessary to refine and select the appropriate products representative of their business services for price collection.

New Sample of Companies and Service Products

13 During the rebasing, new companies were selected from DOS's business register and surveyed to collect detailed service specifications and prices for their service products. These service products and prices were monitored throughout the base period, and clarifications with the companies were made where necessary to ensure that the price changes can be captured adequately. In addition, internet prices were explored as a data source to reduce respondent burden for companies that publish the prices of their service products online. Clarifications were made to confirm the accuracy of the published rates, and the internet pricing of five companies were adopted for the new base year.

14 Subsequently, the in-scope products were reviewed along with the existing products from the 2016-based CISPI to determine the final frame for the 2021-based CISPI. Overall, this rebasing exercise allowed DOS to ensure that the service products in the index are representative of the current activities and market share of the industry, while rotating out some of the smaller companies to minimise respondent burden. In summary, the 2021-based CISPI survey frame was 23 per cent smaller than that of the 2016-based CISPI, with approximately 100 companies rotated out of the index and replaced with 70 new companies.

Comparison of Weighting Patterns

Figure 4 shows the weights distribution for 2021-based and 2016-based CISPI. In the 2021-based CISPI, CPCPI continued to be the largest contributor to the weights at 61.5 per cent, although it declined 23.2 percentage points from the 2016-based CISPI. Within the CPCPI, Application Development and Integration services retained the largest weight share as compared to Maintenance and Support services. The ISOPI weights increased from 15.3 per cent to 38.5 per cent, attributed mainly to the addition of Online Marketplace services. Within the ISOPI, Online Marketplace services is the largest weight contributor (21.9 per cent), followed by Hosting & Analytics services (13.1 per cent) and Data Centre services (3.6 per cent).



Figure 4: 2021-based and 2016-based CISPI Weights Distribution at Main and Service Level Indices

Comparison of Price Trends

16 Figure 5 compares the price trends between the 2021-based and 2016-based CISPI from the first to fourth quarter of 2021, which is the period of overlap between the two base years. The price trends of the overall CISPI for both base years generally moved in tandem with slight differences in magnitude, which can be attributed to the changes in composition of companies and service products. For ISOPI, the 2016-based and 2021-based series trended in the same direction except in 2Q2021, as a result of the addition of online marketplace products in the 2021-based index. More information on the weights and indices of the 2021-based CHPI and WSPI are available in Appendix II.



Figure 5: 2021-based and 2016-based CISPI for First to Fourth Quarter 2021

-2021-based -2016-based (rescaled to 2021)

IV LINKING OF HISTORICAL SERIES

23 To facilitate comparison of price changes over time, the price indices prior to 2021 are linked to the new series by re-scaling them to the new base year 2021 level. The linking is obtained through the following mathematical procedure:

Linked (2021-based) Index = 2016-based Index \times Linked Coefficient

where the Linked Coefficient is the ratio of the annual 2021-based index in 2021 to the annual 2016-based index in 2021.

V DISSEMINATION OF DATA

24 Data on the overall CISPI are released in the quarterly Services Producer Price Indices (SPPI) report, on the 25th day of the 3rd month after the reference quarter, or the next working day if it falls on a Saturday, Sunday or Public Holiday. The report can be accessed on the Singstat Website (https://go.gov.sg/report-sppi) or through the QR code appended below. The CISPI can also be downloaded via the SingStat Table Builder (https://www.singstat.gov.sg/tablebuilder).



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GLOSSARY

GLOSSARY OF TERMS AND DEFINITIONS

Base Year:

Also known as the price reference year, that is, the period whose prices appear in the denominators of the price relatives used to calculate the index. It is also understood to be the year which the index is set equal to 100.

Charge-out rate:

The price charged per unit in pricing based on working time methods. Normally this is a man-day rate charged to a client for services and designed to recover all costs of providing the service.

Contract pricing:

A pricing method that uses real transaction prices when the same producer for the same client repeats the services across survey periods. Prices of contracts are agreed for more than one period when the contract is signed or renewed.

Direct Use of Prices of Repeated Services:

A pricing method that represents the ideal of using real transacted prices, or less preferably list prices, of the same service product in successive survey periods.

Laspeyres Price Index:

A price index defined as a fixed-weight index that uses the basket of products of the base year.

Linked Coefficient:

A ratio that is applied to join a new index series to form a continuous series with an old index series (or vice versa).

Linking:

The technique used to join two consecutive sequences of price indices that overlap in one or more periods to form one continuous series.

Percentage Fee:

Refers to data type in a price survey. They are data on both the value of a service, and the percentage fee from which an actual fee (price) can be calculated.

Pricing Methods:

A procedure solely concerned with data relating to prices that is put in place by index compilers to make price data suitable for use in index compilation. Carried out prior to compiling the lowest level indices, the selection of the appropriate pricing method for a service product or industry is largely determined by the pricing mechanism employed for that product or industry.

Price Relative:

The ratio of the price of an individual service product in one period to the price of that same service product in another period.

Rebasing Exercise:

A series of activities undertaken to update the weighting structure and basket of products in an index to a new base year. It involves studying the industry changes, obtaining the latest available weighting information (either from administrative sources and/or survey data), and sampling new companies on top of the routine price surveys to determine the final basket of products that is representative of the current market structure. The rebasing exercise starts before the base year and typically requires at least fifteen months to complete.

Services Producer Price Indices:

The services producer price indices (SPPIs) are designed to trace price movements that reflect the supply and demand conditions in the service markets, with a view to facilitate the analyses of macro-economic conditions and monitor inflationary pressures. SPPIs are also used as deflators in national accounts.

Service Specifications:

A detailed list of the characteristics that identify an individual sampled service product. Its purpose is to ensure that a consistent price is collected from period to period relating to a consistent service product with the same terms of sale in each period.

Time-based Price:

The price is calculated based on a pre-determined amount of time used in rendering the service.

Weights:

A set of numbers used to weight price relatives. Weights and price relatives are averaged to obtain higher level price indices.

Weight Reference Period:

The period in which the detailed weights were determined for the index.

APPENDICES

APPENDIX I: Index Computation of CISPI

- I. The CISPI uses the weighted arithmetic mean Modified Laspeyres formula where the weight reference period of 2019 preceded the price reference period of 2021.
- II. At the most detailed level, a price relative is derived for each service product by taking the ratio of the current quarter's price to its corresponding base period price. The price relatives of the service products together with their respective weights are aggregated to form the Service level price indices. The weighted average of these sub-indices forms the Main level price indices, and consequently the overall CISPI.

Price Index at Overall Level:

$$I_t = \sum W_m \times I_{mt}$$

where, I_t = price index in period t W_m = the relative weight of the m^{th} main service index $\sum W_m = 1$

Price Index at Main Level:

$$I_{mt} = \sum_{k=1}^{m_k} W_k \times I_{kt}$$

where, I_{mt} = price index of the m^{th} main service index in period t W_k = the relative weight of the k^{th} service type m_k = number of service types within m^{th} main service index $\sum W_k = W_m$

Price Index at Service Type Level:

$$I_{kt} = \sum_{j=1}^{n_k} w_j \times PR_{jt}$$

where, I_{kt} = price index of the k^{th} service type in period t PR_{jt} = price relative of j^{th} service product in period t n_k = number of service products within k^{th} service type w_j = relative weight of the j^{th} service product $\sum w_j = W_k$

Price Relative at Service Product Level:

$$PR_{jt} = \frac{P_{jt}}{P_{j0}} \times 100$$

where, PR_{jt} = price relative of j^{th} service product in period t relative to base period P_{jt} = price of j^{th} service product in period t P_{j0} = price of j^{th} service product in the base period

Duizo Indou	WEIGHTS	2021			
Price maex		1Q	2Q	3Q	4Q
COMPUTER CONSULTANCY & INFORMATION SERVICES	10,000	99.0	100.0	100.3	100.6
COMPUTER PROGRAMMING & CONSULTANCY	6,146	98.7	99.6	100.7	101.0
APPLICATION DEVELOPMENT & INTEGRATION	5,183	98.7	99.6	100.8	101.0
MAINTENANCE & SUPPORT	963	99.2	99.4	100.1	101.2
INFORMATION SERVICES & ONLINE	3,854	99.4	100.7	99.8	100.1
MARKETPLACE					
ONLINE MARKETPLACE	2187	99.7	100.9	99.7	99.7
HOSTING & ANALYTICS	1310	98.9	100.6	99.9	100.6
DATA CENTRE	357	99.7	99.8	100.1	100.4

APPENDIX II: Weights and Sub-Indices of 2021-based CISPI

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