Measuring quality change in services

Case studies on Information Services and Architecture and Engineering Services

Richard Heys, Office for National Statistics

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Context

- It is essential for deflators to be comparing like-with-like products and services
- Accounting for quality change in services is particularly difficult
 - Services are intangible, perishable and unique
 - Rapid technological advancements have led to brand-new services not yet adequately captured by current classification systems

Introduction to case studies

- We have investigated quality change in two services that have experienced significant quality improvements:
 - CPA J63 (Information Services)
 - Rise of cloud computing
 - CPA M71.1 (Architecture and Engineering Services)
 - Use of technologies such as BIM, drones and digital twins



Case study 1

CPA J63 – Information Services



Case study 1 - CPA J63 (Information Services)



63			Information service activities	
	63.1		Data processing, hosting and related activities; web portals	
	63.11 Data processing, hosting and related activities63.12 Web portals		Data processing, hosting and related activities	6311
			Web portals	6312
	63.9		Other information service activities	
	63.91 News agency activities		News agency activities	6391
		63.99	Other information service activities n.e.c.	6399

- In 2022, CPA J63 accounted for 0.4% of GDP(O)
- Our SPPI only includes items classified under J63.11
- We believe cloud computing services should mostly be captured within J63.11





Quality change in Information Services



E-Commerce and ICT Activity, ONS, 2021

- Rise of cloud computing services over the last few decades
- Cloud market in the UK was estimated to be worth over £35 billion by 2023 – a 73% rise from 2019
- Challenge in understanding exactly where this should be classified in CPA 2.1



CPA J63

Sample

CPA 6 dig	Description	Sample composition
63.11.11	Data Processing Services	3 specific services
63.11.12	Web Hosting Services	8 specific services
63.11.13	Application Service Provisioning	8 specific services
63.11.19	Other Hosting and IT Infrastructure Provisioning Services	4 specific services





International comparison



- Undertook an in-depth international comparison across six countries; Canada, Germany, Ireland, Japan, Norway and USA.
- There does not appear to be an internationally standard method or trend





International comparison

What quality adjustment is used?

Canada	Does not at the moment, planning to quality adjust the cloud computing component of the Information Services index using hedonic methods.	
Germany	Price change taken as quality change for a new product, Overlap or Direct Price comparison depending on available information.	
Ireland	Bridged overlap.	
Japan	Does not at the moment, possibility of using some indicators like the number of unique users, page views, and viewing times.	
Norway	Firms have the option to replace services that have changed quality and missing prices will be imputed.	
USA	Respondents will be asked to provide cost data for quality adjustment.	





Using an index of cloud computing prices

- ONS's deflators team met with a couple of experts in the area, who:
 - Were surprised by the upward trend in our SPPI
 - Suggested that the period from 2007 onwards would be the most important period to account for cloud computing
 - Felt that the issues with the sample were the biggest problem
- Professor Diane Coyle suggested using data from her work constructing a price index for cloud computing services to deflate the cloud computing component of J63



Using an index of cloud computing prices



Notes: This figure shows nominal and quality-adjusted prices of AWS EC2 large and xlarge instances for Linux. Prices are hourly on-demand rates deflated by the aggregate price index. In blue, prices are also quality-adjusted for performance improvements.

Source: AWS API price lists (<u>https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/price-changes.html</u>) for prices, AWS press release for performance improvements, and pre-2019 data from Coyle and Nguyen (2018).

Coyle and Nguyen (2018) and Coyle and Hampton (2023)

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Case study 2

CPA M71.1 – Architecture and Engineering services



Case study 2 - CPA M71.1 (Architecture and Engineering Services)



- CPA M71 accounts for 1.16% of GDP and 4.83% of the service sector
- Current pricing method is time-based
- Exact contracts are unknown
- Quality change is not accounted for





Quality change in Architecture and Engineering Services

- Recent technological advancements like drones, BIM and digital twins have increased productivity and decreased costs
 - Drones used in surveying improve accuracy
 - Digital twins enables real time monitoring
 - BIM allows collaboration between businesses and clients





Sample

CPA 4 dig	Sample composition	Coverage	CPA 6 dig
Architectural Services (71.11)	38 observations	19.5% coverage	Building project architectural advisory services (71.11.24)
	33 suppliers		Project site master planning services (71.11.33)
			Landscape architectural services (71.11.41)
Engineering Services and Related Technical Consulting	69 observations	52.8% coverage	Engineering advisory services (71.12.11)
Services (71.12)			Engineering services for building projects (71.12.12)
	55 suppliers		Engineering services for industrial and
			Project management services for construction projects (71.12.20)
			Geophysical services (71.12.32)





International comparison

- Undertook an in-depth international comparison across six countries; Germany, The Netherlands, USA, Canada, Japan, Australia, and New Zealand
- All countries (except Canada) experienced significant increase in their SPPI compared to the UK
- Majority use model pricing
- None explicitly account for quality change





Options to account for quality change

- Change of pricing method
 - Model pricing implicitly accounts for quality change
 - Used by majority of the countries we researched





Findings and Conclusions



Common challenges and options

- 1. Sample size
 - CPA J63
 - 23 specific services
 - Only J63.11 (Data processing, hosting and related services) currently included in the SPPI for J63
 - CPA M71.1
 - 107 observations
 - Low coverage 19.5% for M71.11 and 52.8% for M71.12



Common challenges and options

2. Change in services being provided over time and how to account for this in classification

- CPA J63
- Cloud computing services
- CPA M71.1
- Development of technology such as BIM



Next steps

- Improving sample and coverage of SPPIs
- Consider changes to pricing method for Architecture and Engineering
- Build understanding of cloud computing use and prices
- Investigate possibility of deflating components of these services (e.g. cloud computing services) at a lower level
- Acting in response to classification updates e.g. ISIC revisions which will classify J63 differently