**11th Meeting of the Advisory Expert Group on National Accounts,
5-7 December 2017, New York, USA**

Agenda item: 4

Digital economy

4.2 Price and Volume measures in times of digitalisation

Introduction

This paper draws on the ongoing work of the Eurostat "Task Force on Price and Volume Measures for Services Activities". This Task Force (TF) is looking into the price and volume measures of a variety of different services, ranging from construction to health and education. In addition, the TF chose to prioritise issues related to the digitalisation of the economy. This paper reports only on this aspect of the TF work, focusing on digital services, digital platforms and substitution bias.

Main issues to be discussed

The AEG is requested to take note of the ongoing work and provide feedback on:

- the measurement of prices and volumes as regarding streaming services, cloud computing and bundled services;
- the treatment of digital platforms in current and constant prices, taking Uber as an example;
- the issue of substitution of outlets and/or products.

11th Meeting of the Advisory Expert Group on National Accounts,
5-7 December 2017, New York, USA

Price and volume measures in times of digitalisation

Prepared by Paul Konijn (Eurostat)

1.   INTRODUCTION

1.   This paper draws on the ongoing work of the Eurostat "Task Force on Price and Volume Measures for Services Activities". This Task Force (TF) is looking into the price and volume measures of a variety of different services, ranging from construction to health and education. In addition, the TF chose to prioritise issues related to the digitalisation of the economy. This paper reports only on this aspect of the TF work.

2.   The TF is focusing on the deflation of certain new digital services such as streaming and cloud computing, as well as the bundling of digital services. This is addressed in section 2 of this paper. Section 3 discusses price and volume measures for digital intermediation platforms, taking Uber as a concrete example. Finally, section 4 revisits the well-known problems of outlet substitution and quality measurement in the context of digital products and outlets.

2.   DIGITAL SERVICES

3.   Online streaming is one form of providing content to a consumer. Types of content can be: motion picture, video and television programmes; music and audio content; software, including computer games, business and other software applications; text and news, e.g. books, newspapers, journals and periodicals; pictures and photos.

4.   Streaming means constantly receiving the requested data without, or only temporarily or partly, storing the content on a local device. During streaming the consumer does not become the owner of the content. There is a legal difference to the purchase of downloadable content, where the consumer acquires the right to use the content in future under specified conditions. The content provider typically remunerates the copyright owners (royalty payments) as a fixed amount per piece played. In the business to customer relation the user usually pays per item streamed or on a subscription basis (payment per month, per year, etc.). Sometimes a basic service is offered for free, for which the customer has to accept advertisement in return.

5.   A popular example for audio streaming is Spotify and for motion picture and video streaming Netflix. Another important activity is online radio or online TV streaming on the internet.

6.   Many countries have started including streaming services in CPIs. It is not clear how many countries have also included them in their PPIs. The main conceptual challenge is to consider quality change, in particular as regards to the continuous change in the offer of songs or programmes available to subscribers. The questionnaire used by the Advisory Group on Measuring GDP in a Digitalised Economy revealed that most countries make no

allowance for such changes. It could indeed be argued that consumers will expect the continuous update (and even expansion) of the offer as a normal part of the service provided. Indeed, if a service provider would stop adding content, consumers will perceive this as a quality decrease.

7.   Streaming and cloud computing are closely related, both being services provided in the cloud. Here, we will use the term cloud computing for non-content related services, like the provision of online storage space, computer processing power or specific online software applications.

8.   Currently, data (whether sales or prices) are not separately available for cloud computing services, although they should be captured in business surveys. It is clear that this type of service is hard to define, given that they are often customised and are continuously changing. However, their market share is increasing rapidly, transforming businesses. Thus, research into methods to capture price and volume changes is urgently needed.

9.   Bundling of information and communication services is becoming more and more common in the market, and the bundles on offer change constantly. Bundles could combine different combinations of fixed line telephony, mobile telephony, fixed line internet access, mobile internet access, hardware (routers, mobiles, TV-sets) and access to content (film, video, music).

10.   We can distinguish "pure" bundles from "mixed" bundles. The first are those bundles that are only available as a bundle and not sold separately. The latter are products which are sold both in bundles and as stand-alone products. For the latter, the official recommendation for the EU Harmonised Index of Consumer Prices (HICP) is to allocate them to the purpose of the main component (if not possible to separate).

11.   Eurostat's Handbook on Price and Volume Measures[1] discusses bundling mainly in the context of combining goods and services (e.g. computers and software), but the issues are the same. The Handbook suggests, for example, to create at the working level special product groups for the bundled products[2]. Capturing quality change for bundles is challenging as the content of the bundles is subject to frequent change.

12.   All of the above issues continue to be discussed in the TF which is due to produce a final report by mid-2018. It will not be realistic to expect concrete recommendations on all of the issues mentioned; the TF however will provide examples of good practices in different countries as well as e.g. defining priorities for further research.

3.   EXAMPLE OF DIGITAL PLATFORM: UBER

13.   This section elaborates on the recording of Uber in the national accounts, as an example to the general issues involved in the treatment of digital platforms. The aim is to

---

[1]   http://ec.europa.eu/eurostat/documents/3859598/7152852/KS-GQ-14-005-EN-N.pdf/839297d1-3456-487b-8788-24e47b7d98b2

[2] The current draft of the new COICOP classification proposes dedicated codes for bundled telecommunication services.

develop guidance on price and volume measures, but, in order to be able to do that, the current price recording needs to be clarified first.

14.   Hence, we'll discuss first the classification of Uber, before elaborating an example of the recording of Uber in supply and use tables, and then discuss possible deflators.

   The classification issue

15.   This is how Uber describes their own services in their terms of service:

   "*The Services constitute a technology platform that enables users of Uber's mobile applications or websites provided as part of the Services (each, an "Application") to pre-book and schedule transportation, logistics, delivery, and/or vendor services with independent third party providers of such services, including* independent *third party transportation providers (…), independent third party logistics and/or delivery providers under agreement with Uber or certain of Uber's affiliates, and/or independent vendors such as restaurants ("Third Party Providers"). Unless otherwise agreed by Uber in a separate written agreement with you, the Services are made available solely for your personal, non-commercial use. YOU ACKNOWLEDGE THAT UBER DOES NOT PROVIDE TRANSPORTATION, LOGISTICS, DELIVERY OR VENDOR SERVICES OR FUNCTION AS A TRANSPORTATION PROVIDER OR CARRIER AND THAT ALL SUCH TRANSPORTATION, LOGISTICS, DELIVERY AND VENDOR SERVICES ARE PROVIDED BY INDEPENDENT THIRD PARTY CONTRACTORS WHO ARE NOT EMPLOYED BY UBER OR ANY OF ITS AFFILIATES.*"[3]

16.   Please note that the capitalisation in the above text is by Uber. It is clearly important for Uber to be seen as a technology platform rather than as a taxi provider. However, despite the above, this will mostly differ from the perception of users, who will see Uber as a transportation service provider. Also, Uber competes with traditional taxis. Uber drivers, even if formally independent, may consider Uber to be their employer[4] (as their source of income is generated by Uber). It is these different perceptions of the different actors involved in Uber transactions that complicate the classification of these transactions.

17.   To classify Uber in NACE, it has to be decided what are the actual services produced. There are basically three options:

- taxi services

- IT services

- intermediation services

18.   A fourth option - Uber as merchanter of taxi services - has been suggested but will not be further explored in this paper. This paper (and the discussion in the TF) focuses on options that could be readily implemented within the current SNA and diverging opinions

---

[3] https://www.uber.com/en-GB/legal/terms/gb/

[4] Indeed, Uber drivers have been legally challenging Uber's policy, and in some cases (for example in the UK) have so far won their cases to receive access to employee benefits from Uber.

exist whether merchanting of (taxi) services is compliant with SNA. Merchanting of services is discussed in chapter 10 of the UNECE Guide to Measuring Global Production. This chapter suggests that the current SNA requires a gross recording of trade in services, although it explores the option to record it net. Then again, SNA para 6.21 does not fully preclude margins on services either.

19.   There are a number of criteria that could help in deciding on the type of service produced by Uber, e.g.:

- Nature of the service provided: Uber does not itself provide the taxi service, but rather an intermediation service between the taxi provider and user;

- Ownership of assets: Uber does not own or lease the cars so can't be a taxi provider;

- Payment flows: households pay Uber, who pays the drivers, after withholding its share;

- Employees: if Uber drivers are to be seen as employees, then Uber must be a taxi company;

- Comparable production processes: Uber's inputs (e.g. labour characteristics) are mostly those of an IT company (if the taxi drivers are kept out of consideration).

20.   The UN Expert Group on classifications, in their meeting of September 2017, discussed the classification of e-platforms, although more focussed on accommodation services than transportation services. There appears to have been support for classifying e.g. Airbnb and booking.com in NACE/ISIC 79.90 "Other reservation services and related activities", which is in fact already included in the case law. Indeed, the notes of that class are clear: "This class includes: - other travel-related reservation services: reservations for transportation, hotels, restaurants, car rentals, entertainment and sport etc." As these platforms do not provide the services themselves, they should not be included within the transport or accommodation categories. The fact that e.g. Airbnb and Uber also arrange the payments between consumer and service provider should not matter for the classification, which should be done on the basis of the predominant good or service produced.

21.   Note that the discussion on the general classification rules for e-platforms will continue at the international level, in particular in the next revision of ISIC/NACE.

22.   In Europe, all Uber transactions appear to be invoiced by Uber BV, Netherlands, the European head office of the company. Uber has offices in other European countries but they appear to provide advertising services or programming services. Their classification should be in line with their main activity, which is probably not taxi services nor reservation services. So the main classification question only concerns the Dutch head office.

Recording of Uber in supply and use tables

23.   Below some options for the recording of Uber payment flows in the supply and use tables are set out. It is assumed, for simplicity, that Uber is based in the same country as

the consumer and the taxi driver. In reality, the service provided by Uber should in most cases be seen as an import.

24.   A household buys a Uber ride for 50 euro. From this, Uber pays the taxi driver 30 euro, keeping 20 euro as the intermediation fee. It is assumed that the household considers this transaction as the purchase of a taxi service.

a1) Treat Uber as a taxi company with self-employed drivers

Supply		use		
	Taxis		taxis	HFCE
taxi service	80	taxi service	30	50
		value added	50	

It is assumed that the taxi drivers are self-employed, providing a service to Uber. A small disadvantage of this treatment is that the total gross output of taxi services includes a double counting of the amount produced by the taxi driver (because taxi services are used as intermediate consumption to produce taxi services).

a2) Treat Uber as a taxi company with employees

If the taxi drivers are to be seen as employees of Uber, the recording would be:

supply		use		
	taxis		taxis	HFCE
taxi service	50	taxi service		50
		value added	50	

b) Treat Uber as reservation service providing intermediation services to the taxi driver

supply			use			
	taxis	Uber		taxis	Uber	HFCE
taxi service	50		taxi service			50
interm. serv.		20	interm. serv.	20		
			value added	30	20	

In this recording, the taxi driver is seen to purchase services from Uber. This does not correspond to the actual payment flows.

c) Treat Uber as reservation service providing intermediation services to households

supply			use			
	taxis	Uber		taxis	Uber	HFCE
taxi service	30		taxi service		30	
interm. serv.		50	interm. serv.			50
			value added	30	20	

Here, the household pays Uber for intermediation services provided, who in turn purchases taxi services as intermediate consumption. The household expenses have to be reclassified from taxi services to intermediation services (requiring separate data collection from expenses on regular taxis).

d) Split the transaction in two parts

	supply			use		
	taxis	Uber		taxis	Uber	HFCE
taxi service	30		taxi service			30
interm. serv.		20	interm. serv.			20
			value added	30	20	

Now, the household is seen to have two transactions: one directly with the taxi driver and one with Uber. It may be difficult in practice to reallocate household expenditures in this way.

Note that in these options we adhere to the NACE rule that the classification of a unit follows its dominant output. More options would be available if we allowed, for example, Uber to be classified as a reservation company while still producing mainly taxi services:

e) Classify Uber as a reservation company that produces taxi services

	supply			use		
	taxis	Uber		taxis	Uber	HFCE
taxi service	30	50	taxi service		30	50
interm.serv.			interm.serv.			
			value added	30	20	

Price and volume measures

25. The choice between the options also impact on the choice of deflators. It should be noted first of all that Uber will likely be included in consumer price indices for taxi services. The HICP, for example, uses COICOP as classification and thus classifies transactions by purpose. COICOP does not have categories for reservation services. So for deflation of consumption using CPIs, it would be best to follow either options a) or b) above.

26. Producer price indices are based on NACE; it is likely that no countries have yet included Uber. However, if the Uber fee is a percentage of the trip fare, compiling a price index for this fee is conceptually not complicated (the difficulty is of course getting information on the actual percentage).

Tentative conclusion

27. The TF is leaning towards preferring option b), which considers that Uber provides an intermediation service to the taxi driver, while consumers purchase taxi services. This would provide a coherent deflation method for consumption, as well as for the output of taxi drivers. The intermediation service of Uber itself will need to be included in the service producer price indices.

28.   Option d) was considered a good alternative, provided data can be obtained to distribute household expenses over the taxi service and the intermediation service.

4.   SUBSTITUTION BIAS AND QUALITY

29.   The above discussion on Uber leads to the conclusion that Uber services needs to be included in the consumer price indices (CPI) among taxi services (of course, wherever Uber becomes a significant player on the market). However, there are several ways to do so. The key question to be answered is whether Uber provides a comparable service to existing taxi services or should be considered a completely different product. In other words, is Uber a quality improvement or deterioration in the eye of the average consumer?

30.   To determine the quality difference between Uber and traditional taxis, one would theoretically:

- find out what are the characteristics of a taxi ride that people (on average) value most. Options are price, speed, comfort, safety, ease of use, payment options, etc...,

- find a way to measure or evaluate these characteristics, and

- assign a value to them in order to be able to quality-adjust the prices.

31.   It is obvious that this would not be an easy task. Statisticians will have to find more approximate ways to make the comparison.

32.   If Uber services are directly compared to traditional taxi services, and assuming that Uber rides are cheaper than the traditional ones, the CPI will be driven downwards by the inclusion of Uber. If an Uber ride is seen as a different, incomparable, product, the implicit assumption being made is that the full price difference between the new and the traditional service is due to quality differences. If Uber is cheaper, it is thus assumed that Uber services are of lower quality, thus driving down volume measures.

33.   This is a classic example of the well-known outlet substitution problem (which is equally relevant for new products). The substitution issue has become more topical again due to digitalisation; e.g. the increasing share of e-commerce in consumption. One underlying issue is that through the internet and other technological advances new or alternative goods and services can be produced in a more efficient way than their traditional counterparts, i.e. at lower prices. These new products are often seen by consumers as improvements to the existing products on offer, at least in some of their characteristics. This invalidates the classic hypothesis that higher quality products must come at higher prices.

34.   The Eurostat Handbook on Price and Volume Measures generally suggest always looking for the finest breakdowns of flows before deflating (see e.g. section 4.7.1). The idea behind this is that quality differences between products are implicitly taken into account by the deeper stratification. Again, the underlying assumption is that higher quality products have higher prices. Further reflection on this is needed in the context of digitalisation.

35.   In response to an IMF/OECD questionnaire on measuring the impact of the digital economy on consumer price indices, a slight majority (sixteen) of responding countries

reported that price differences in distribution margins that occur from buying products provided on-line versus providing them in a store, should be, as least from a conceptual point of view, treated as a difference in quality, thus affecting the volume change. On the other hand, thirteen countries thought that they should be treated as a price differential. Thus, divergences of opinions exist, and may affect the comparability of resulting data. It will be important to reach a consensus on the recording approach.

5.   QUESTIONS TO THE AEG

36.   This paper only reflects on a limited number of issues related to price and volume measurement and digitalisation. Other important aspects, e.g. deflators for computers and software, are not addressed here as they are subject to deliberation in fora other than the TF.

37.   The AEG is requested to take note of the ongoing work and provide feedback on:

- the measurement of prices and volumes as regarding streaming services, cloud computing and bundled services;

- the treatment of digital platforms in current and constant prices, taking Uber as an example;

- the issue of substitution of outlets and/or products.