

**Consumer Price Indexes for Telecommunications Services  
Based On A Sample of Customer Bills:  
Summary Of Progress**

Sophie Vassiliou

Prices Development  
Australian Bureau of Statistics  
e-mail: [sophia.vassiliou@abs.gov.au](mailto:sophia.vassiliou@abs.gov.au)

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## 1. Introduction

This paper discusses the work done so far in deriving a consumer price index (CPI) for telecommunications services using a sample of customer bills. The bills correspond to an annual account or statement that includes all details of service usage (e.g. call time, day of week, duration, destination ) and other service access charges if relevant, for an entire twelve-month period.

Despite the substantial data demands of this method, all Australian telecommunications carriers enrolled in this collection are motivated to participate in this endeavour and are in the process of extracting data to our specifications and have agreed to provide ongoing support with sample maintenance and quarterly re-pricing of the bills.

In order to achieve methodological consistency and reduce respondent burden, the bill method is being applied for all in-scope telecommunications services and for different user groups, i.e., for both the CPI and producer price index (PPI) series.

## 2. Scope and coverage of telecommunications services in the Australian CPI

The scope is all services acquired directly by households from telecommunication providers, for example, basic access, local calls, national long distance calls, international long distance calls, fixed-to-mobile calls, mobile telephony services and internet access services.

*Reference population and regions:* The CPI measures price changes relating to the spending pattern of all Australian metropolitan private households. The term 'metropolitan' refers to the six State capital cities, Darwin and Canberra. Because the CPI is compiled for each capital city, and calling patterns vary from State to State, we have asked respondents to select bills with a scatter of postcodes in the suburbs of the capitals.

*Weighting method:* The index will be weighted using expenditure weights based on aggregate service revenue data provided by each respondent.

*Compilation and estimation:* At this early stage, it is anticipated that a simple additive index formula (e.g., Laspeyeres) will be constructed to estimate the movement of prices in telecommunications over time. The overall index will have several layers that will culminate in a single aggregate index number. Although the following structure is currently possible it may not be so in future as providers' service and customer stratification practices may change over time.

## **Telecommunications services**

### **Capital City**

#### **Fixed network (voice) services**

Provider 1

low users

medium users

high users

Provider 2

low users

medium users

high users

#### **Mobile services**

Provider 1

GSM network delivery

low users

medium users

high users

CDMA network delivery

low users

medium users

high users

## **Internet access services**

### Provider 1

#### Dial-up access

low users

medium users

high users

#### Broadband access

low users

medium users

high users

Mobile services are sold in either prepaid or post-paid plans. By necessity, an alternative method for estimating price change in pre-paid expenditures will need to be devised as the bill method cannot be applied to these services.

The first step in the stratification process for mobile telephony is to split services by Global System for Mobile Telecommunications (GSM) and Code Division Multiple Access (CDMA) delivery systems as customers face different price structures and service quality under each system.

The next division will be into user groups that range from low to high level users divided by usage or bill spend levels as recorded on customer bill records.

Like mobile services, internet access services are sold in either pre-paid or post-paid plans. By necessity, an alternative method for estimating price change in pre-paid expenditures will need to be devised as the bill method cannot be applied to these services.

The first step in the stratification process is to split services by access technologies, between dial-up and broadband access.

As for mobile services, the next division for each of the access technologies will be into user groups that range from low to high level users divided by usage or bill spend levels as recorded on customer bill records.

#### **4. Classification of telecommunications services**

An important step in the process was liaising closely with respondents to ensure that customer segmentation across all in-scope services could be undertaken. It has proven possible to identify and classify most service categories, and pricing plans from which bills are sampled, as wholly consumer. For the very few services where this was difficult to do, it was suggested to respondents that they use an 80/20 rule to do this i.e. if the marketing manager of the particular service division considered that at least 80 per cent of the customers subscribing to a particular service/pricing plan are residential customers, then the entire plan is classified as consumer.

#### **5. Respondent relations**

The bill approach requires the ongoing cooperation of and a close working relationship with telecommunications carriers. This has been successfully achieved in Australia.

Ongoing personal visits to respondents were made in the early stages of the process to enlist cooperation, gather preliminary information on the nature of services provided to consumers, pricing structures and to identify the extent to which respondents were able to segment their customer base between residential and business customers. The difficult but not insurmountable task for respondents is ensuring that the data are extracted in a manner compatible with our specifications and the way bill records are kept in their billing information systems.

Despite the substantial data demands of this method, all Australian telecommunications carriers enrolled in this collection are motivated to participate in this endeavour and are in the process of extracting data to our specifications and have agreed to provide ongoing support with sample maintenance and quarterly re-pricing of the bills.

#### **6. Pricing methodology**

The motivation for adopting the bill approach is that sample customer bills are sufficiently representative of the types of telecommunications services that consumers are actively purchasing. It is a way of capturing the actual transaction prices paid by consumers for these services which is particularly important when the prices paid depend on total volumes.

Respondents have agreed to supply 12 months worth of transactions for each customer bill selected. Where 12 months worth of bills cannot be readily extracted, respondents have started as far back into their bill archives as they can and move forward from that point to build up a year's worth of call records for those bills ear-marked as sample bills.

Privacy issues arise in sampling of customers' bills. The bills which are supplied to the ABS are confidentialised unit records. That is, respondents remove from each bill all the information -- name, address, and bill number -- which identifies the individual customer and make the selected bills anonymous by deleting the customers' names and addresses, and replacing their bill numbers with unique sequential identifiers (e. g. ABS #1, 2, 3 . . ).

To avoid bias in the sampling process, respondents are asked to provide ABS with a description of the order in which they propose to access customers' bills for selection purposes; the average number of customer bills Australia wide; and the average number in each of the capital cities.

The sampling procedure requires respondents to firstly discard any dormant bills and then randomly select from the remainder. Starting with a random number between the first and the *n*th bill, respondents then choose every *n*th bill thereafter until the specified number of bills for each capital city have been selected. Postcodes are used as the filter in this process to restrict bill selection to capital city residents. To avoid bias, respondents read the whole service file during the selection process. It follows that *n* will vary depending on the number of bills in each capital city for each service.

At this stage, the intention is to update the expenditure patterns in the sampled bills annually. This will pick up any changes in households' use of these services and allows for the opportunity to rotate a proportion of the sample. More bills are sampled than are actually processed to have enough bills to allow for rotation even if some of them become inactive over the year. Respondents are asked to supplement the number of sample bills each year so that a pool of spare bills is available.

## **7. Technical concerns (pricing difficulties)**

The construction of consumer price indexes for telecommunications services will encounter the same problems as other price indexes. The issues of service bundling, churn, new services and for mobile telephony, the question of handset subsidies are all important issues and difficult to address. In this early stage, work is focussed on maintaining and improving the quality and integrity of the data received from respondents.

While the bill method provides a good solution to the bundling within telecommunication services (albeit at the expense of sub-indexes for the items included in the bundle such as local and long-distance calls, and access rights), the prospect for broader bundling is a great concern. Broader bundling would involve single suppliers providing phone services, electrical services, television services etc.

Consumer churn poses a problem in measuring price change as a significant element of the overall price change is associated with the change of supplier. A method of measuring price change which picks up this change due to customers changing suppliers (i.e "churning") is needed. To date the approach taken in the case of utilities

has been a large scale collection of data from major suppliers. This is a high cost approach, especially in establishing the collection but also in staying on top of industry developments.

A common feature of the telecommunications services industry is the desire on the part of carriers to meet or surpass competition from other suppliers. They do so by developing new pricing plans, with often significantly lower prices. Over time the situation arises where a large number of plans come into existence with different customers paying different prices for the same service depending on when they were signed up and how vigilant they have been in pushing the supplier for lower prices. This poses obvious problems for measuring price change.

## **8. Future work**

In the years to come, this dynamic sector of the economy may have to cope with expected mergers, the outsourcing of billing information systems and changes in the type of services offered to meet consumer demand. Therefore, we will have to constantly follow any new trends that will impact upon our price change estimation methods. Good respondent relationships will ensure that we will be in a position to measure price changes correctly.

Future work will involve addressing the above methodological issues and also devising appropriate techniques to enable better quality adjustments to be made in telecommunications price index calculations.