

# A Redeveloped Corporate Services Price Index for Business Telecommunications

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## Summary

- The provision of business telecommunication services forms an important component of the UK, corporate service, economic activity. Recognising this contribution, the experimental Corporate Services Price Index (CSPI) first incorporated a business telecommunications price index in November 1998, based on a rate method of pricing. Recent market competition within the telecommunications sector, has seen a considerable fall in the recognised price of business telecommunication services. However, the initial CSPI series did not reflect fully the rate of reduction in prices and has been subsequently redeveloped.
- The new business telecommunication index was released with the 2000=100 rebased CSPI dataset on 20 February 2004 and is now based on a unit value method.
- This article discusses the recognised challenges and options in developing a price index for the dynamic, business telecommunication service sector, which is driven by rapid technological change and strong market competition. The advantages and limitations of the new, unit-value methodology are discussed and the resulting series assessed against market information.
- It is concluded that the new business telecommunication CSPI pricing methodology supports a more representative, flexible and homogeneous structure of services, which accommodates better the marketing patterns observed in the telecommunications sector and is suitable for future expansion.
- The new business telecommunication CSPI methodology is also known to align with the approach taken by other national statistical institutes.

## Introduction

The experimental Corporate Services Price Index (CSPI) measures quarterly price changes in the provision of domestic corporate services by businesses to other businesses and to central and local government. Services provided to private individuals or to companies operating outside the UK are out of scope for the CSPI. The history and achievements of the CSPI have been reported previously in *Economic Trends* (Price 1996, Skipper 1998, Palmer 2000).

The CSPI has been recently rebased to the year 2000, with the methodology and impact reported in an accompanying article (Barford and Fenton 2004) available in the *Experimental Statistics* section of the *National Statistics* website ([www.statistics.gov.uk/cspi](http://www.statistics.gov.uk/cspi)). The article includes an impact assessment of the introduction of the redeveloped business telecommunications CSPI into the top-level index. Towards the objective of increasing the CSPI coverage of UK corporate service activity, a new banking CSPI has also been released in the rebased dataset of February 2004. The scope and methodology applied in the development of the banking CSPI is reported in an accompanying article (Allen 2004) available in the *Experimental Statistics* section of the *National Statistics* website ([www.statistics.gov.uk/cspi](http://www.statistics.gov.uk/cspi)).

This article reports the redevelopment of a price index for the provision of business telecommunication services. The telecommunication sector is known to be globally dynamic in both structure and service products as a result of a regulatory regime which promotes strong market competition, rapid technological advance and a complex price and discounting practice. The first part of this article examines the changing telecommunications sector and service products. The second part explains both the methodological options for a business telecommunications price index and the method implemented in the new CSPI. The third part

of this article analyses the new business telecommunications CSPI levels and growths and compares the characteristics with market information. The last section looks ahead to the future services that will be provided by the business telecommunication sector and indicates how the new CSPI could evolve to track those changes.

## **Part 1 – The Telecommunications Service Sector**

Telecommunications is a very dynamic industry, which is susceptible to both rapid changes in technology and rapid customer movement to new services. It is one of the most challenging services against which to capture current price movements. The UK telecommunications sector had an estimated turnover of £41.6 billion (Source: ONS Annual Business Inquiry) in 2001/2002. The strongest, recent growth in the UK telecommunications market has been in internet and mobile services. There is an underlying, global movement towards future communications convergence, which may see the integration of telecommunication services with IT services (telephone, computer and television). This makes both a telecommunications structure model and representative service product weightings a challenging problem to establish and maintain. The telecommunications sector appears to change contract conditions on services as frequently as price changes, supporting the need for an appropriate quality adjustment method. Owing to the global importance of business telecommunications in many countries, national price indices have been widely developed.

The services of the UK telecommunications sector may be appropriately partitioned into two dominant groups; fixed line and wireless (mobile) communications. The output of fixed line telecommunications may be considered to be the provision of voice or data communications, over a telephone line. The output of the mobile telecommunications may be defined as the connection and transmission of voice or data over a radio-frequency network.

Other major telecommunication services include the provision of interconnection services and the provision of, and delivery of services over, leased lines. Interconnection services include the carriage of voice and data traffic for service providers over alternative networks. The provision of leased lines allows companies to operate on a dedicated communications link, with high-bandwidth, digital technology. This saw strong, corporate growth in 2001/2002. The UK telecommunication sector has also recognised recent, small growth in fixed line service provision, driven by the business customer seeking conversion from analogue to digital transmission, such as ISDN. Recent increases in internet growth now sees 63 per cent (2001/2002 figures) of UK businesses with internet connectivity. The fastest growing area of the mobile market in 2001/2002 was the Short Message Service (SMS) text messaging service. Services are priced using a mixed scheme of

fixed recurring charges, fixed non-recurring charges and variable usage-charges.

## **Part 2 – Pricing Methodology**

### ***Options for Pricing Telecommunication Services***

There are three dominant pricing methods for estimating telecommunication prices. Those methods are the *billing* method, the *rate* method and the *unit-value* method. This section seeks to explain the advantages and limitations of each method and the reason for the introduction of the unit-value method as the preferred CSPI method.

### ***The Billing Method***

The bill method of pricing offers the advantage that it is relatively straightforward, in theory, to implement. The method requires that a representative sample of telecommunication customer bills are surveyed and the prices for each telecommunication service are collected. The sampled bills in the base year would then define the service product weighting patterns for subsequent index compilation. There is an underlying assumption that the calling patterns of customer bills in subsequent surveys will be the same as those of the base year. Experience has shown that this assumption is unlikely to be correct. However, the calling patterns collected for the base year could be re-priced using the current rates and discounts, thereby monitoring a price change. The disadvantage of this method is that telecommunications bills are often complex in that a level of use of some services may provide a discount in another service on the bill. The survey respondent is required to be knowledgeable about the complex pricing schemes employed by the telecommunication service providers. An additional weakness of this method is that business bills will often range in their complexity, which has been found (from US experience) to bias the survey response to those sample units, who had smaller, less complex bills. Those businesses with more complex bill structures were found to be less likely to respond in a survey. The marketing of bundled telecommunication products to companies, which complicates the distribution of charges in bills, places an unacceptable burden on the survey respondent and has caused the bill method to fall into disfavour. Although this methodology was introduced into the US in 1995, it has since been replaced, for the reasons stated.

### ***The Rate Method***

The rate method involves studying the changing value of rates for common business telecommunication services. A price index is constructed using a set of profiles of typical, customer services.

However, the identification of a representative set of profiles of typical customers (which remains valid over time) can prove to be difficult, given the fast changing nature of the telecommunications sector.

The rate method was adopted in the initial UK CSPI for business telecommunications. The rates were provided by Tarifica, a private telecommunication-sector analysis service, for the fixed line market and from 'What Cellphone' magazine for the mobile market

Technological innovation is a major factor that has a substantial impact on the demand patterns for telecommunication services. The initial CSPI approach excluded call charges between the fixed and the mobile markets, internet connection charges, text messaging, roaming and discounting because these were not significant or in existence at that time. It was found that the methodology was too rigid to deal with a rapidly changing sector and lacked the ability to incorporate new services as they became available. Changes in demand ought to have led to changes in the weights within the index (since the weights are based on revenue) to avoid major bias.

An additional problem encountered with the rate method was discounting. In the fixed line and mobile markets, increased competition within the sector resulted in an increase in discounts offered to new customers as service providers tried to acquire a greater share of the market. Increased bargaining power of the consumers (including businesses) was another factor that had a strong impact on the scale of discounts offered. The rate method did not capture the discounting component leading to a bias of the index. Insufficient account was also taken of changes in mobile contracts and migration from one provider to another.

After consultations with the UK Office of Communications regulator (Ofcom), previously the Office of Telecommunications (OfTel) it was concluded that the index appeared to be too flat, especially in the late 1990s. During that period a considerable decline in the level of the index would have been expected. The implication was that the index was unlikely to represent the true price as it failed to account for substantial price changes brought about by increased competition.

It was recognised that the rate method was not the most appropriate approach to measure the price changes within an industrial sector characterised by substantial changes in demand. Other national statistics institutes have also employed the rate method, including the US and Canada, and have found similar weaknesses.

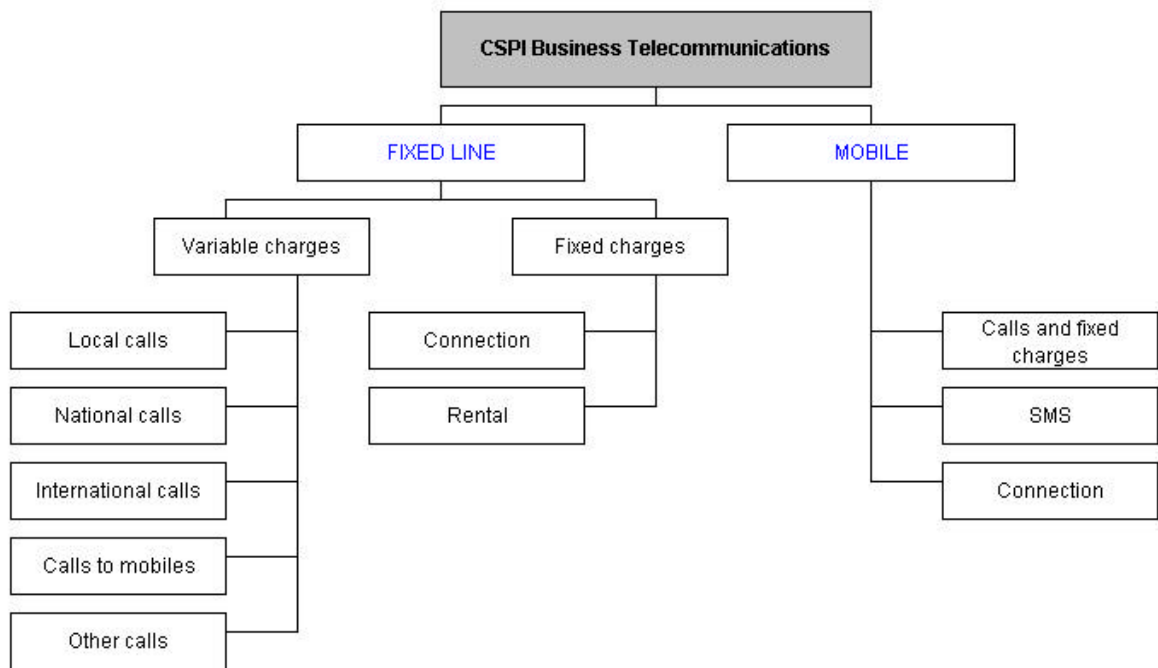
### ***The Unit-Value Method***

A price index, based on the unit-value method produces the smallest level of aggregation by obtaining a unit-value, defined as the ratio of revenues in pounds to volumes in minutes, for a homogeneous group of telecommunication products. The unit-value approach is the method that has been adopted by the Office for National Statistics (ONS) for the new business telecommunication CSPI. Since all ONS CSPIs are constructed using the Laspeyres formula, homogeneity of products is an important precondition, necessary for the development of an appropriate and representative price index.

The new index is constructed by aggregating sub-indices for the fixed line market and the mobile market, as depicted in Figure 1. Quarterly census data collected by Ofcom, for the fixed line market, is sufficiently detailed to differentiate clearly between the usage (variable) charge and recurring (fixed) charge products of the fixed line market. The variable charge product is disaggregated further into local, national, international, calls to mobiles and other calls (including internet) while the fixed charge product is disaggregated into connection and rental sub-products. The mobile sub-index is disaggregated into calls and fixed charges, SMS messaging and connection charge sub-products. The CSPI disaggregation of service products has achieved relatively homogeneous groups that enable a more representative price index to be constructed than was the case with the rate method. Note that data is available separately for business and residential use of fixed line services, but this split is not available for mobiles. However, an assumption has been made that the revenue ratio of 'calls to mobile' from business and residential fixed-line services is maintained for calls made from mobiles. No information is currently available to confirm or invalidate this assumption. The ratio is applied at the mobile sub-index level and thereby is assumed to be equally valid for the SMS calls and connection-charge service products, within the 'mobile' branch of the telecommunications service structure.

The unit-value method calculates an average price at a detailed level of aggregation that yields a proxy estimate, rather than a true value. The unit-value approach is considered to be more appropriate than the rate method, which is characterised by a large bias and difficulty in maintaining a constant quality of index. The unit-value approach offers advantages over the bill and rate method, particularly when services are bundled and service charge is tied to usage. However, a potential disadvantage of the unit-value pricing approach is through the potential creation of inhomogeneous product groups. The development of a fully representative index for telecommunication services is seriously hampered by changes in the quality or the emergence of new products (due to frequent technological advances) that leads to

**Figure 1 The business telecommunication service structure**



changes in demand. As already mentioned, changes in demand lead to changes in weights (since weights are based on revenue) which implies that the weights used in the index following the introduction of new products become out of date. Hence, a potential problem with the unit value approach may arise in the future should we fail to augment the index to avoid the emergence of a new service bias. Indeed, this is a problem for all pricing methodologies. The weighting of a new service into the service structure of Figure 1 is problematic, if the index does not have data available for the base year of the index. To align with other CSPIs, the business telecommunication index has been implemented as a Laspeyres index with five year rebasing of weights.

The change in the use of the existing services is not considered to be such a problem with the unit-value approach as with the other pricing methods, as the service product groups in the family tree will retain the migration of business consumers between old and improved services, thereby retaining the revenue within the groupings.

The new business telecommunication CSPI receives revenue and volume data from a quarterly census on fixed line and mobile markets compiled by the UK communications regulator, Ofcom. The new CSPI price index series for business telecommunications, based on the unit value approach, is depicted in Figure 2. The series is based in the year 2000 and, owing to a latency in the quarterly data provision, the Holt-Winters (non seasonal) exponential smoothing method has been used to forecast data for the latest quarters. The Holt-Winters forecasting method has been used at product group level (i.e. at the fixed line and mobile level)

as fixed line data lags by two quarters and mobiles data lags by one quarter. This means that the available mobile data is utilised. Rather than using the forecast index value, the forecast growth rates have been used. The residuals will be monitored over time, but at present, this appears to be the most appropriate available forecasting method. Given the fact that forecasting is necessary, the last two quarters of the series will have a provisional status.

### Part 3 – The New Telecommunications Price Series

#### Index Analysis

It is observed in Figure 2, that the newly developed business-telecommunication CSPI series captures a steeper decline in service price than the previous index based on the rate method. In the late 1990s government deregulation of the fixed and mobile markets, combined with a generally favourable UK economic environment, led to the strong competition for new and existing customers. However, the index based on the rate methodology failed to account for any major price changes. Between 1997 and 2002 the index decreased by just 11 per cent. Over the same period, the index based on the unit value methodology decreased by 48 per cent, which better represents the telecommunication sector's understanding of the true movement of prices within the industry. Attention to the growth rates of its sub-indices (depicted in Figure 3) indicates that there was a substantial decrease in the mobile index throughout the period. This corresponded to a period of intense price competition between the four, major mobile-service providers.

Figure 2 Comparison of old and new CSPI for business telecommunications and the new CSPI growth

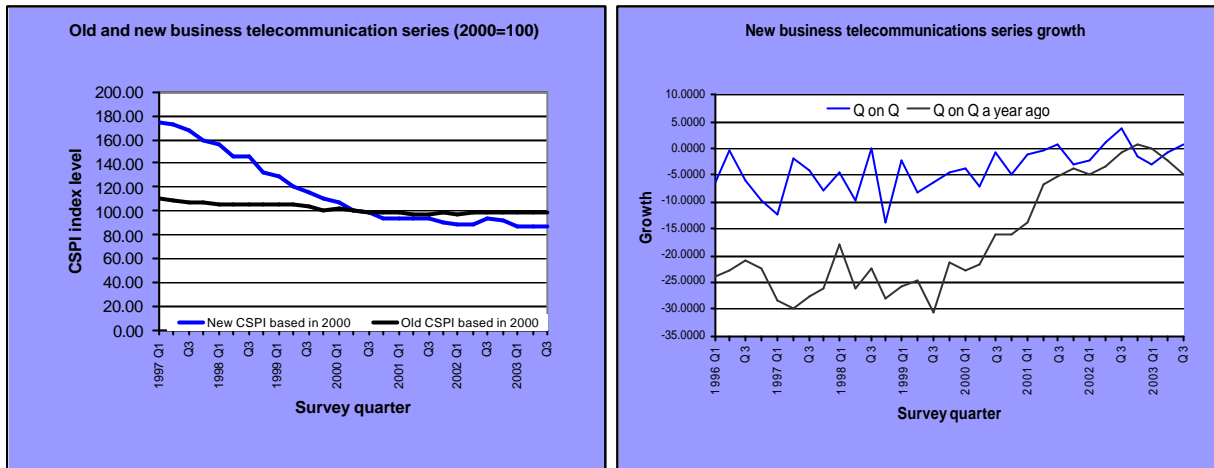
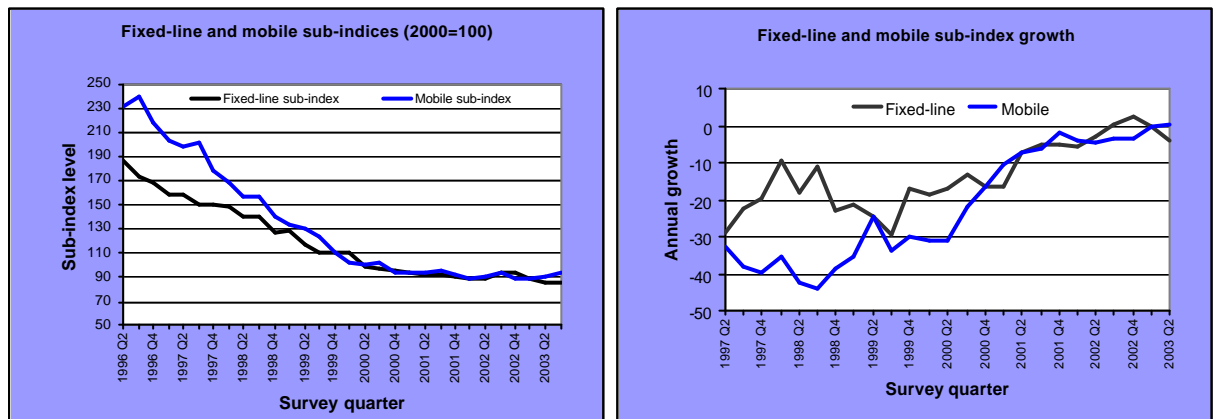


Figure 3 CSPI business telecommunications fixed-line and mobile sub-indices



Over the last three years the telecommunication companies have largely consolidated their positions within the market, and have reduced price reductions significantly.

Until recently, the market for fixed telephony in the UK was an example of a near monopoly, with the market almost entirely dominated by a single service provider. The consequent lack of any competition, prevented substantial price decreases. However, since the mid 1990s, government deregulation (combined with further regulation of existing suppliers) and technological innovation have allowed new service providers to enter the market.

Increased competition within the fixed line market over the last six years has resulted in substantial price decreases, as depicted in Figure 3. Between 1997 and 2002, the price index has decreased by 43 per cent. In fact, over 2001 and the first half of 2002, we have seen periods of greater price decreases within the fixed line market than within the market for mobile phones. That is 8 per cent decrease in the fixed line market, as opposed to a 2 per cent decrease in the market for mobile phones.

### Index Improvement

Maintaining the homogeneity of products at the lowest level of aggregation is an important factor in the construction of an appropriate and representative Laspeyres price index for business telecommunications. An area of potential index improvement could be the future disaggregation of the 'other calls' category of the fixed line product group. Although, this group is currently dominated (90 per cent) by dial-up internet services, the movement to broadband internet access could merit a separation of the dial-up internet-service activity from the other service products. Indeed, it could be argued that in the future this group should constitute a completely separate sub-index within the overall index (on the same status as fixed line and mobile markets). However, since this is essentially a fixed line service, there is presently no need to create a completely separate sub-index. The continuing increase in broadband services to corporate customers (currently estimated to be a third of UK Small and Medium Enterprises) for internet connection is not currently represented in the index. Increasing use of this service

could provide another product within the 'fixed charges' family of products under the 'fixed-line' product-group or create a separate product group under the 'fixed-line' product class.

There may also be future potential to divide the 'international calls' service group through further disaggregation into Europe1, Europe2, North America and 'other' price categories. However, over the last few years, the telecommunications consumer has seen a price convergence between the rates for Europe1 and North America. Furthermore, Europe1 and much of Europe2 markets are likely to merge this year, following the expansion of the European Union eastward. In view of this, there is no immediate need to disaggregate further this group of products.

It should be noted that the growth rates of the new CSPI series for business telecommunications, depicted in Figure 2, have been revised prior to the rebasing link-period of Q1 1998. Owing to the price and weights data not being available for the previous CSPI 1995 base year, the series has been backcast from Q2 1996. It is likely that the business telecommunication series will be subject to further revision under the continuing programme of quality improvement of the experimental CSPI and it should be noted that the pre-1998 business telecommunications series will also be subject to revision.

## Part 4 – The Future Directions

With the release of the redeveloped CSPI for business telecommunications, it is relevant to consider future trends in the telecommunication sector and the ability of the CSPI to track those developments for intermediate consumption.

In addition to the current expansion in broadband internet connection, the future emergence of the 3G mobile phones may have a considerable impact on the mobile index and the overall CSPI index for business telecommunications in the years to come. As the competition intensifies within this new market, it is increasingly likely that a considerable shift in demand, away from the current generation of mobile phones toward the 3G will occur. Given the impact of a shift in demand on revenue and therefore the weights within the index, there is a danger that the weights currently used in the index may become outdated as the demand shifts from one generation of mobile phones to another. Therefore, the CSPI will have to augment the service structure for this change in demand if it is to avoid the emergence of a new service bias within the index. A possible approach to this would be to disaggregate the mobile index further into the current generation and the third generation service .

Given the large number of services and the probability of a greater

divergence in prices, it would be desirable to disaggregate the 3G sub-index into a greater number of levels than is the case with the current generation of mobile phones. However, the level of disaggregation would obviously depend on the availability of data from Ofcom. Connection charging within the current generation of mobile phones has been almost entirely phased out. However, given the high costs associated with obtaining the new licences and setting up the necessary infrastructure for the 3G, it is more likely that the cost of connection will be substantial, at least in the initial phase.

## Conclusions

The new UK CSPI for telecommunications has applied the unit-value approach, recognising the technical advantage of this methodology and the format of data, provided from the proxy supplier Ofcom. It may be concluded that the new unit-value methodology and service product structure provides a more representative, flexible and homogeneous structure of services than the previous, rate based index. The new index reflects better the price movements recognised by the industry and is suitable for future expansion.

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